



Gravity Local Development Order

Environmental Statement February 2022 Volume 1: Main Report

Final Adopted Version

On behalf of **This is Gravity** and **Sedgemoor District Council**



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This report has been prepared by Stantec UK Limited ('Stantec') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which Stantec was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e., parties other than the Client). Stantec accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

Foreword

This is Gravity Ltd (Gravity), is proposed to be the UK's first commercial smart campus, creating a blueprint for a smarter, cleaner future - faster. It will deliver a new era of possibility by hosting and supporting companies who are committed to making a difference socially, economically, and environmentally, driving the UK's transition to a cleaner economy.

With its unique scale and immediate availability as a 616-acre enterprise zone, excellent connectivity to national and local infrastructure including Bristol port and airport, the Site is located at the heart of a South West innovation cluster comprising Bristol University's Smart Lab, the Bristol Robotics Lab, the National Composites Centre, the Institution of Advanced Automotive Propulsion (IAPPS), creating a centre of excellence in the UK for transport decarbonisation, electrification and innovation.

With dark fibre in place, and working with Cellnex, Gravity can offer digital connectivity as well as an accessible talent pool including four top-tier universities and a high performing college close by to meet workforce needs. With on-site water provision, national scale energy including renewable and low carbon energy infrastructure and energy management solutions, Gravity can provide occupiers with the ability to invest, transform and create a new era of green jobs driven by advanced manufacturing, as part of a 4th Industrial Revolution.

Gravity establishes the foundations for accelerating and transforming the economy through enabling a smart campus whilst simultaneously creating a new commercial environment geared to cutting greenhouse gas emissions, creating good jobs, integrating low carbon homes and realising positive social outcomes for local communities. Gravity will be a low carbon campus generating more than 4000 green collar jobs and potentially up to 7500 jobs, depending on end occupier, providing both a strategic economic stimulus to drive economic renewal, shaping and connecting to a green supply chain across the UK. Home to international business, start-ups and SMEs, Gravity will be a home for Clean Growth and green industries, creating the space to innovate and create sustainable solutions from energy solutions to smart homes and new smart mobility choices. Gravity is a UK destination for international occupiers and will drive the delivery of the Sedgemoor, Somerset, and Heart of the Southwest Local Enterprise economic, climate change, and Local Industrial Strategy: delivering transformational investment opportunities, unlocking connectivity through infrastructure, and bringing new higher value employment and skills opportunities to the Southwest as a whole.

Gravity is being taken forward through a Local Development Order (LDO) which is a route to planning permission. LDOs are a positive planning tool and a marketing tool for the locality and site. They create a more certain planning environment for investors and potential occupiers, and thereby make inward investment more attractive. They embody a fundamental shift on the part of local authorities from waiting for the market to come to them with a proposal, to initiating development by granting permission for the kind of development that they want to come forward on a site. The Gravity LDO is therefore informed by the market to be highly responsive in a national and international context and will help Sedgemoor, Somerset and the Southwest region, compete for scarce investment against other national and international competitors.

The function of an LDO is to accelerate delivery. They are about adopting a local solution to simplifying planning and provide local authorities with a flexible tool to address particular circumstances. Over 100 LDOs now exist across 80 authorities who wish to be proactive in attracting investment. The Gravity LDO will further demonstrate SDC's proactive approach to economic development and being 'open for business'. As such, in adopting the Gravity LDO, Sedgemoor will add a robust management tool for the EZ, to complement the Development Plan, to achieve corporate, economic, and planning policy objectives to the benefit of the local, regional, and national economy providing maximum benefit to the Sedgemoor community.

Contents

Foreword	iii
1 Introduction.....	1-1
1.1 Project Background	1-1
1.2 Terms and Definitions	1-1
1.3 Existing Planning Consent within the LDO Boundary	1-4
1.4 The Environmental Statement.....	1-4
1.5 Structure of the Environmental Statement	1-4
1.6 The Environmental Impact Assessment Team	1-5
1.7 Availability of this ES	1-5
2 Site Description	2-1
2.1 Site History	2-1
2.2 Site Location.....	2-3
2.3 Site Description	2-3
2.4 Environmental Context	2-5
3 The Proposed Development.....	3-1
3.1 Introduction and Plans.....	3-1
3.2 Description of the Proposed Development.....	3-1
3.3 Strategies supporting the Proposed Development.....	3-9
3.4 Embedded Mitigation.....	3-9
3.5 Consideration of Alternatives	3-10
3.6 Post LDO Adoption.....	3-25
4 Demolition Construction and Site Management	4-1
4.1 Introduction	4-1
4.2 Demolition and Construction Works and Programme	4-1
4.3 Construction Management	4-1
4.4 Construction Traffic	4-2
4.5 Construction Waste	4-3
5 Assessment Methods.....	5-1
5.1 Introduction	5-1
5.2 EIA Regulations.....	5-1
5.3 The EIA Process.....	5-1
5.4 Screening	5-2
5.5 Scoping.....	5-2
5.6 Consultation.....	5-2
5.7 Assessment Scenarios	5-3
5.8 Cumulative Effects.....	5-17
5.9 Assessing Effects	5-17
5.10 Uncertainty and Limitations	5-18
5.11 Mitigation	5-19

5.12	Residual Effects.....	5-20
5.13	Significance Criteria.....	5-20
5.14	Impact Interactions	5-21
5.15	Monitoring.....	5-22
6	Planning Policy Context	6-1
6.4	Build Back Better: our plan for growth.....	6-4
6.5	Planning for the Future White Paper	6-6
6.6	National Planning Policy Framework.....	6-6
6.7	Bridgwater Vision.....	6-8
6.8	Sedgemoor Local Plan 2019	6-8
6.9	Core Strategy	6-9
6.10	Puriton Energy Park SPD	6-10
6.11	Relevant Sedgemoor Local Plan Policies	6-12

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1 Introduction

1.1 Project Background

- 1.1.1 An Environmental Impact Assessment (EIA) has been managed by Stantec UK Limited (Stantec) on behalf of Gravity and Sedgemoor District Council (SDC) in relation to the Local Development Order (LDO) for a Site known as Gravity, to the east of Junction 23 of the M5, in Sedgemoor, Somerset (referred to hereafter as 'the Site') to grant a simplified, flexible planning permission capable of meeting market requirements for the Gravity Smart Campus and Community ("Proposed Development").
- 1.1.2 This Environmental Statement (ES) presents the findings of the EIA and identifies and assesses the likely significant environmental effects of the Proposed Development during demolition, construction and operation.
- 1.1.3 The 261.54 hectare site is within ownership of This is Gravity Ltd and is within the administrative boundary of Sedgemoor District Council (SDC) and the full site is a Government approved Enterprise Zone, designated to attract international inward investment. The Site is largely a brownfield regeneration site, being previously used as a single industrial use as an ordnance manufacturing facility. A previous consent (the 'Remediation Planning Consent') has approved site remediation and this is complete, and a second consent (the '2017 Planning Consent') has enabled the construction of a new link road as part of that consent, also complete (October 2021).
- 1.1.4 The LDO represents the next phase of the consenting process to re-imagine the Site within a new era of clean inclusive growth and this will facilitate the delivery of the Gravity Smart Campus and Community, establishing a planning regime for fast track responses and implementation to be highly responsive to international business needs.
- 1.1.5 The Proposed Development is framed to attract large scale advanced manufacturing facilities to the UK to accelerate progress towards achieving a net zero carbon economy, hosting new business to support transport decarbonisation and the shift to electrification. Gravity will be a key driver in the UK and regional economy to take positive action to address climate change.
- 1.1.6 An LDO is intended to grant planning permission for specific types of development within a defined area. LDOs streamline the planning process by removing the need for developers to make a detailed planning application to a Local Planning Authority. The implementation process is replaced by a fast track compliance process when individual proposals can be authorised within the LDO framework. LDOs create certainty for prospective occupiers and save time for those involved in the planning process, whilst ensuring that public interests such as an inefficient land-use and environmental protection are balanced. A simplified planning regime was a key part of the Memorandum of Understanding between the Government, the District and County Councils and the Heart of the South West Local Enterprise Partnership, to facilitate inward investment and job creation, and to enable local business rates retention from the Enterprise Zone to support delivery and locality transformation. The LDO responds to that commitment.

1.2 Terms and Definitions

- 1.2.1 For ease of reference the following terms have been used throughout the ES:
- **The Site** – the area within the LDO boundary at **Appendix 1.1, Volume 2**;
 - **Proposed Development** – the development to be consented by the LDO;
 - **LDO** – Local Development Order;

- **SDC** – Sedgemoor District Council, which will make the LDO;
- **This is Gravity Ltd (Gravity)** – landowner of the Site;
- **The 2013 HEP Application** – the hybrid planning application for the Huntspill Energy Park (HEP) which related to the majority of the Site;
- **2017 Planning Consent** – The planning permission for HEP received in November 2017 (reference number 42/13/00010). The boundary of the 2017 Planning Consent is shown at **Appendix 1.2, Volume 2**;
- **Remediation Planning Consent** - demolition of existing structures and remediation works for the Former Royal Ordnance Factory (ROF) site were subject to a separate planning application which was approved by SDC on 3 April 2012 (reference number 42/11/00017);
- **Advanced Manufacturing** - the use of innovative processes, practices and technologies to improve existing and create new products, increasing competitiveness and productivity across the manufacturing sector;
- **Huntspill Energy Park** – the name of the development approved by the 2017 Planning Consent;
- **Royal Ordnance Factory** – ROF – the former use of the land on which the 2017 Planning Consent was granted;
- **Within ROF fence** – Land within the Site boundary which is within the historic Royal Ordnance Factory site;
- **Outside ROF fence** – Land within the Site boundary that is outside the historic Royal Ordnance Factory site;
- **Gravity Link Road** – new road which connects the Site to the A39 and then to Junction 23 of the M5 to the west due to be completed in October 2021;
- **Enabling works** – demolition, land clearance, site preparation and construction processes; as described in part (a) of the Description of Development at **Section 4.2**;
- **The approved village enhancement scheme** – this was identified as mitigation for the 2017 Planning Consent and will be implemented one year from the opening of the Gravity Link Road; the scheme will improve linkages between Puriton to Woolavington and delivering traffic calming in both villages;
- **Approved Developments** – planning permissions in the vicinity that are partially built out and extant planning permissions with which there is the potential for significant adverse cumulative effects to occur with the Proposed Development. These have been agreed through Scoping with SDC and are factored into the 2032 baseline. The Approved Developments are outlined in **Appendix 1.3, Volume 2** and their locations shown on the map provided in **Appendix 1.4, Volume 2**;
- **Parameter Plans** – plans that establish parameters for the Proposed Development. These plans form the basis of the assessment in this ES. These are included in **Appendix 3.1a-g, Volume 2**;
- **Concept Plan** – an indicative plan which shows how key structural elements, such as green infrastructure and land uses, could be distributed across the Site within the

parameters set by the Parameter Plans. This is an indicative plan and has not been used as the basis of this ES. It is provided in **Appendix 1.5, Volume 2**.

- **Design Guide** – forms part of the LDO and identifies design principles for a deliverable scheme that responds to the Site’s technical and environmental constraints and opportunities; the Design Guide has informed the assessment in this ES;
- **Compliance Form** – a form that enables applicants to demonstrate that proposals are in compliance with the specifications set out within the adopted LDO documents. This form is appended to the LDO.
- **Current State of the Environment** - the state of the environment in 2021, which includes part implementation of the 2017 Planning Consent (i.e. Gravity Link Road, ecological enhancements and site remediation completed);
- **2032 Baseline** - The current conditions at the Site and in the surrounding area which have been factored forward to predict likely conditions at the Site in 2032 to enable the effects of the LDO to be considered against a ‘do nothing’ scenario. This includes the 2017 Planning Consent (but excluding the safeguarded energy land uses), the Gravity Link Road and the Village Enhancement Scheme, approved/allocated developments in the vicinity and likely changes to the natural environment between now and 2032;
- **Safeguarded Land Uses** - these were identified in the 2013 HEP Application and include the below. They were considered as part of the HEP ES but were not consented.
 - **Energy generating uses (38.74 hectares – 95.7 acres):** dependent upon their energy output, applications were to be made to the Planning Inspectorate if 50MW output or greater, or to Sedgemoor District Council if lower than 50MW;
 - **Rail Reinstatement (5.4 hectares – 13.3 acres):** Land safeguarded to reinstate the redundant rail line from the north-west corner of the site and down the western boundary.
 - **Leisure use (11.7 hectares – 28.9 acres):** in respect of:
 - Two rugby pitches, associated changing rooms, car parking and relocation of an existing football pitch;
 - Minor alterations to the layout of an existing fishing club;
 - A new skate park.
- **Embedded mitigation** – measures which are designed to be an inherent part of the Proposed Development and are set out in the Mitigation Checklist in Chapter 4 of the Design Guide;
- **Further mitigation** – measures which require further activity to be achieved, and form an inherent part of the Proposed Development through the Design Guide and management processes;
- **Impact** – in relation to the outcome of the Proposed Development (e.g. the removal or modification of habitat or a proposed improvement to reducing emissions to air);
- **Effect** – the consequent implication of an impact in environment terms (e.g. the loss of trees on site and of potential visual impact of the development, or an improvement in local air quality).

1.3 Existing Planning Consent within the LDO Boundary

- 1.3.1 Part of the Site, then known as Huntspill Energy Park, received hybrid planning permission for an Energy Park in November 2017 (the '2017 Planning Consent'). Prior to determination of that application, the Site secured Enterprise Zone status in 2015, becoming live from April 2017. Some elements of the 2017 Planning Consent, including the Gravity Link Road and the Remediation Planning Consent, have already been implemented with remediation complete and the road completing in October 2021.
- 1.3.2 The Site boundary for the 2017 Planning Consent, referred to as the 'Hybrid Planning Application Boundary' is shown on the plan in **Appendix 1.2, Volume 1**. As a comparison, this plan also shows the Site boundary, referred to on the plan as the 'Gravity Smart Campus and Community Boundary'. This plan also shows the Enterprise Zone boundary.
- 1.3.3 Background to the 2017 Planning Consent is provided in **Chapter 2**.

1.4 The Environmental Statement

- 1.4.1 This ES presents the findings of an EIA undertaken in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended), referred to as the 'EIA Regulations'. Particular provision for LDOs is made in Regulation 32 of the EIA Regulations.
- 1.4.2 Running concurrently with the design process, the EIA has sought to identify any likely significant environmental effects, adverse and beneficial, to identify appropriate design, construction and management measures and apply good practice to mitigate any significant adverse environmental effects. The EIA has also sought to determine the residual beneficial and adverse environmental effects remaining after mitigation measures have been incorporated.

1.5 Structure of the Environmental Statement

- 1.5.1 The ES comprises the following volumes:
- **Volume 1 – Main Report (this document);**
 - **Chapter 2:** describes the Site and Surrounding Area;
 - **Chapter 3:** summarises the Proposed Development;
 - **Chapter 4:** outlines the demolition and construction works and site management;
 - **Chapter 5:** provides the methodology adopted to undertake the EIA;
 - **Chapter 6:** summarises the planning and policy context;
 - **Chapters 7 to 16:** comprise the technical assessment chapters;
 - **Chapter 17:** provides an assessment of impact interactions;
 - **Chapter 18:** provides a schedule of mitigation and monitoring; and
 - **Chapter 19:** glossary of abbreviations used in the ES.
 - **Volume 2 – Figures and Technical Appendices; and**
 - **Non-Technical Summary.**

1.5.2 The results of the EIA are presented in this ES.

1.6 The Environmental Impact Assessment Team

1.6.1 The project team for this EIA is set out below. In accordance with Regulation 18(5)(b) of the EIA Regulations, a statement outlining the relevant expertise and qualifications of the competent experts appointed to prepare the ES is provided in **Appendix 1.6**.

EIA Coordination	Stantec
Economics	Stantec
Human Health, Social and Wellbeing	Stantec
Transport and Access	Stantec
Noise and Vibration	Stantec
Air Quality	Stantec
Biodiversity	Ecology Solutions
Water Environment	Stantec
Landscape and Visual	The Richards Partnership
Climate Change	Stantec
Cultural Heritage	Wessex Archaeology

1.7 Availability of this ES

1.7.1 Members of the public may view an electronic copy of the NTS, Volume 1: ES and Volume 2: Appendices online at https://www.sedgemoor.gov.uk/planning_online.

1.7.2 Members of the public may view a hard paper copy of the NTS, Volume 1: ES and Volume 2: Appendices (in whole or in part) at the following locations (subject to prevailing COVID-19 restrictions):

- **Sedgemoor District Council**, Bridgwater House, King Square, Bridgwater TA6 3AR – subject to the council being open (currently from 4th October 2021); or
- **The 37 Club**, 1 West Approach Road, Puriton, Bridgwater TA7 8AD – during opening hours.

1.7.3 A hard copy of the NTS, LDO and Design Guide has been provided to Puriton and Woolavington Parish Council.

1.7.4 A hard copy of the NTS is available for free upon request (please contact Sedgemoor District Council at customer.services@sedgemoor.gov.uk for further information) or via the Thisisgravity.co.uk website.

1.7.5 A hard copy of the full Environmental Statement can be made available at a cost of £450.

2 Site Description

2.1 Site History

- 2.1.1 The majority of the Site, formerly known as Huntspill Energy Park (HEP), received planning permission for an Energy Park in November 2017 (the '2017 Planning Consent').
- 2.1.2 Approximately 250 hectares (616 acres) of the HEP site was part of the former Royal Ordnance Factory (ROF) owned by BAE Systems. The ROF site was closed by BAE Systems in 2008. The Site was acquired by Gravity in 2017. Since 2017, Gravity has focused on remediation of the former ROF site, construction of the Gravity Link Road and the re-imagining the Site to facilitate a new era of clean and inclusive commercial growth which will deliver on climate action and create decent work. This has been achieved through a review of the UN Sustainable Development Goals to re-position the regeneration of the Site.
- 2.1.3 Prior to determination of the Huntspill Energy Park application (The 2013 HEP Application) the Site secured Enterprise Zone (EZ) status in April 2017. The EZ became live on the 1 April 2017 and runs for 25 years until 2042.
- 2.1.4 The development approved by the 2017 Planning Consent was defined by a Parameters Plan, which is provided at **Appendix 2.1**. This identified the scale, location and uses for those parts of the Site for which planning permission was sought as well as identifying areas safeguarded for energy generating uses, rail connection and leisure uses (which would be the subject of separate planning applications). A note setting out the Parameters established by the 2017 Planning Consent and Environmental Statement is provided at **Appendix 2.2**.
- 2.1.5 An ES was prepared for the 2013 HEP Application as follows:
- An Environmental Statement was submitted with the 2013 HEP Application in April 2013 (the '2013 ES');
 - An Environmental Statement Update was submitted in October 2013 (the '2013 ES Update'); and
 - An Environmental Statement Addendum was submitted in June 2017 (the '2017 ES Addendum').
- 2.1.6 The ES documented the EIA process which considered the likely significant effects of firstly, the development to be permitted by the grant of planning permission and secondly, the safeguarded areas included as part of the planning application. A realistic scenario was identified for the energy generating uses included in the safeguarded areas to allow the EIA process to assess the likely significant effects of these uses with the development which was permitted by the 2017 Planning Consent at the Site.
- 2.1.7 Demolition of existing structures and remediation works for the Former ROF site were subject to a separate planning application which was approved by SDC on 3 April 2012 (42/11/00017). These works were also considered in the ES prepared for the 2013 HEP Application as they were considered integral to the overall project.
- 2.1.8 A few buildings, including some buildings currently being used as site offices by Gravity, are still located on the Site. These will be demolished under the LDO as shown on the Existing Buildings to be Demolished Parameter Plan in **Appendix 3.1g**.
- 2.1.9 The majority of demolition and remediation works were completed in November 2020 (see **Section 17.2** for more details on site remediation).

2.1.10 Several elements of the 2017 Planning Consent have also been implemented as follows:

- The new road access onto the A39, referred to as the Gravity Link Road, including the Green Bridge. Construction of the road is ongoing and is scheduled to open in October 2021.
- An employment and skills plan which is part of the local labour agreement implementation has been agreed through the Gravity Link Road contractor.
- The Village Enhancement Scheme, an obligation within the Section 106 agreement, has achieved planning consent and is passing through the technical approval process with Somerset County Council in order to be delivered in accordance with the obligation. This will be in place by Autumn 2022, one year from the opening of the Gravity Link Road.
- Another obligation requiring the agreement of a Framework Local Labour Agreement (FLLA) has also been discharged with the FLLA being agreed and signed by This is Gravity Ltd and SDC in December 2020.
- Ecological works required as part of the demolition and remediation works have been undertaken, including the newt ponds constructed in the north-west corner of the Site; clearance of the majority of trees and vegetation from the development area; Great Crested Newt fencing and badger mitigation. These elements are therefore included in the ecology baseline for the EIA for the LDO. The ecology baseline is set out in detail in **Chapter 12 Biodiversity**.
- A number of pre-commencement planning conditions have also been discharged. These include those which relate to the delivery of the Gravity Link Road but also site wide conditions. At the time of writing this ES, the following site-wide conditions have been discharged:
 - Condition 12 - Remediation Works
 - Condition 13 - (Parcel Specific Contamination Assessment) (partially discharged at time of writing)
 - Condition 22 – Security Masterplan
 - Condition 23 – Operation & Maintenance Manual for Surface Water Drainage Infrastructure
 - Condition 24 – Ecological Management Plan Framework
 - Condition 29 – Strategic Design Code
 - Condition 30 – Assessment of Existing Surface Water and Effluent Disposal Infrastructure
 - Condition 31 – Strategic Surface Water Management Plan
 - Condition 33 – Ecological Reed Bed Assessment
 - Condition 34 - Ecological Mitigation and Enhancement Strategy
 - Condition 35 – Foul Drainage
 - Condition 36 – Strategic Landscape Masterplan

- 2.1.11 In addition, works to Junction 23 of the M5 have been completed by other parties and contributions have been made by This is Gravity Ltd to advanced transport modelling and assessment.

2.2 Site Location

- 2.2.1 The Site is located between the villages of Puriton and Woolavington, approximately 6km north east of Bridgwater. The Site lies approximately 2km to the east of Junction 23 of the M5 motorway. A Site Location Plan is included in **Appendix 1.1**.

2.3 Site Description

- 2.3.1 Gravity comprises 261.54 hectares (646.29 acres) of land, of which approximately 250 hectares (616 acres) was part of the former ROF which closed in 2008. The majority of the Site, associated with the ROF, is brownfield land hosting a primary industrial manufacturing use over the past 70 years. Land on the edges of the Site, in particular to the south and east, is currently greenfield agricultural land.
- 2.3.2 The Site includes four spurs from the main relatively square central Site area:
- To the north-west: which comprises the route of the former railway spur, crossing the M5 motorway, to join the Bristol-Exeter mainline railway;
 - To the north, a spur runs from the central Site area to the Huntspill River and contains a large system of reed beds;
 - To the east, the Site is linked to the B3141 Causeway by a narrow strip of land which is the current access track to the fishing lakes; and
 - To the south, a large spur which is the route of the new Gravity Link Road connecting the central area of the Site from its south west end to the A39 and M5 Junction 23 via a route running to the east and south of the village of Puriton and linking in to the A39 immediately south of Puriton. This new access road is currently under construction due to open in October 2021.
- 2.3.3 An annotated site plan showing some of the Site features described in this section is provided at **Appendix 2.3**.
- 2.3.4 The area of the Site relating to the former ROF has been remediated to ensure that any residual contamination does not pose an unacceptable risk to the health of future occupants or the environment.
- 2.3.5 The Site is low lying and flat with levels across the Site varying between 4.5 to 7.3 metres above ordnance datum (AOD). The underlying geology is mapped as Langport Member, Blue Lias Formation, and Charmouth Mudstone Formation interbedded Limestone and Mudstone which are overlain, across most of the Site, by superficial Tidal Flat Deposits.
- 2.3.6 The local area is known as Puriton Level and is crossed by rhynes (drainage ditches). These provide the existing surface water drainage on Site, eventually discharging into the Huntspill River to the north or River Parrett to the west. Some of these rhynes pass through the Site, conveying flows from the upstream catchment, whilst the rhynes on site discharge into these.
- 2.3.7 Linking the Site and the Huntspill River to the north is a system of reed beds which historically provided treatment for the process effluent from the ROF. However, following the remediation of the Site, effluent is no longer discharged into the on-Site rhynes, ditches or reed beds. At its most northern point, a small, confined area of the Huntspill River National Nature Reserve (NNR) lies within the Site boundary.

- 2.3.8 Broadly, the Site comprises a brownfield site with areas of grasslands, woodland, scrub, hedgerows, tall ruderal, and ephemeral vegetation along with standing water, reed bed, wet and dry ditches, as well as buildings, hardstanding and significant infrastructure and utilities from the former use buried underground and subject to removal. There are also areas of disturbed / bare ground. Materials from the site are being processed and sorted for reuse.
- 2.3.9 There are eight Local Wildlife Sites (LWS) located, or partially located, within the Site boundary: Puriton Rhynes and Ponds; Borrow Pit, Puriton; Puriton Cowslip Field; Puriton Ash Ground; North Mead Drive Fields; Puriton Meadows and Rail Spur; Stoning Pound Field South and Stoning Pond Rhyne; and Woolavington Road and Fields North.
- 2.3.10 Newt ponds, constructed as mitigation for the Site remediation works, are located in the north-west corner of the Site. Other ecological mitigation works on site include Great Crested Newt fencing and badger mitigation.
- 2.3.11 Fishing ponds are located in the east of the Site, within the Puriton Rhynes and Ponds LWS, and these form part of the Gravity ownership, but do not fall within the Enterprise Zone designation.
- 2.3.12 In the south of the Site, in the area where the Gravity Link Road joins the former ROF Site, balancing ponds have been installed for the road.
- 2.3.13 The south east of the Site and along the southern boundary outside the ROF Site, contains a mix of scrub, hedgerows, tall ruderal and semi-improved grassland associated with the agricultural land use and relatively small fields separated by hedgerows. This area includes a remnant orchard in the south-east corner.
- 2.3.14 In the north-west corner of the Site, associated with the Puriton Meadows & Rail Spur LWS, are trees and shrubs and four ponds which contain Great Crested Newts.
- 2.3.15 There are some areas of agricultural land that are within the Site, in the north west and western parts of the Site, and along the southern boundary. Review of Natural England's Agricultural Land Classification Map South West Region identifies that this land is likely to be of Good to Moderate (Grade 3) agricultural value.
- 2.3.16 The Site is well served by utilities (gas, electricity, and water) and on the west edge also benefits from a (currently disused) link into the rail network, reinstatement of which is an integral part of the LDO. This will see the rail link be reopened for both passengers and freight, as shown on **Appendix 3.1b: Transport and Movement: Strategic Infrastructure Parameter Plan**.
- 2.3.17 There are National Grid overhead lines crossing the Site. Existing 133kV Pylons cross the Site in the south-east corner and also in the north-west corner. It should also be noted that whilst consented but not yet installed, Hinkley Point C Connection 'T' pylons (400kV) will pass along and within the eastern boundary of the Site, replacing the existing pylons in the south-east corner of the Site. The current programme of works sees these T pylons and overhead lines completed in Mid-2024.
- 2.3.18 A small substation, the Black Ditch 33kV Switch Station, is located in the north west of the Site, under the existing overhead line.
- 2.3.19 In terms of access, the Site benefits from the Gravity Link Road and the link to the B3141 Causeway as explained above. There is also an established access onto Woolavington Road in the form of a Y-shaped priority junction where the western and eastern approach roads link to form a single point of entry to the Site. Access by rail (currently disused) is gained by the spur to the west.

- 2.3.20 The new Gravity Link Road includes a landscape bund which has been included to provide visual and noise screening of the road to nearby residential properties. A 'green' bridge has also been installed to the south of Puriton to carry a public bridleway over the Gravity Link Road.

2.4 Environmental Context

- 2.4.1 The village of Puriton lies immediately to the south west of the Site and the village of Woolavington lies immediately to the south east. Beyond Puriton, approximately 2km west of the Site, lies junction 23 of the M5 motorway and the motorway runs in north-south orientation. Puriton and Woolavington contain the closest dwellings to the site.
- 2.4.2 As well as the M5 motorway, the closest roads are Woolavington Road which runs in an east-west direction between the villages of Woolavington and Puriton to the south of the Site, the B3141 Causeway which runs in a north south direction between the villages of East Huntspill and Woolavington to the east of the Site.
- 2.4.3 The Site lies within central Somerset, a low-lying area criss-crossed by a network of rhynes, running south from the Mendips to the Blackdown Hills.
- 2.4.4 The Huntspill River lies immediately to the north of the Site. It is essentially a large reservoir constructed to provide a water supply to the former ROF. Water levels are managed to be 3.5mAOD in the summer and 2.9mAOD in the winter.
- 2.4.5 Within 5km of the Site there are a number of internationally and nationally designated nature conservation sites. These are:
- Huntspill River National Nature Reserve (NNR) - located immediately to the north of the Site, with a small section (c.0.7ha) overlapping with the Site. This NNR consists of open water, lowland grassland, and small areas of woodland. It supports populations of Otter and Barn Owl. It is also designated due to its supporting and connecting habitat between the Severn Estuary Special Protection Area (SPA) located 2 km to the west of the Site and Somerset Levels SPA located 4 km to the east of the Site;
 - Bridgwater Bay Site of Special Scientific Interest (SSSI) and NNR - situated approximately 2.4km to the west of the Site at its closest point. The SSSI forms part of the Severn Estuary Special Protection Area (SPA) and Ramsar Site. Part of the Bridgwater Bay SSSI also forms part of the Severn Estuary Special Area of Conservation (SAC). This area is designated for its important populations of wildfowl and waders, its coastal habitats and three annex II species of fish;
 - Catcott, Edington and Chilton Moors SSSI is situated 3.1km to the east of the Site. This SSSI forms part of the Somerset Levels SPA and Ramsar Site, the latter being designated for its important assemblages of wintering wildfowl and waders including four Annex I species.
- 2.4.6 The Environment Agency flood maps (which do not take account of flood defences) indicate that the majority of the Site is in Flood Zone 3 (defined as land with a 1 in 100 or greater annual probability of fluvial flooding or with a 1 in 200 or greater annual probability of tidal flooding). Some small areas are located in Flood Zone 2 and 1, with medium and low probability of flooding respectively. The tidal reaches of the River Parrett pass within 5km west of the Site and tidal flood defences have been constructed along the Parrett Estuary which are effective in this location and will be supplemented by the Bridgwater Tidal Barrier, due for delivery by 2025 (target date at time of writing), as a comprehensive, long-term solution. Detailed flood modelling demonstrating low risk of inundation has been completed as part of the baseline and evidence base and it is important to note that there are no records of flood events having affected the Site since its construction.

- 2.4.7 The natural geology consists of silt/clay alluvium overlying interbedded mudstone and limestone of the Blue Lias. The upper part of the alluvium has been reworked due to construction of the ROF, and there are greater thicknesses of fill associated with areas of historical development and waste disposal. Localised areas of contamination are generally associated with the presence of fill materials however, as stated above, the Site has been remediated as part of a previous planning consent.
- 2.4.8 Groundwater levels in the alluvium and bedrock are typically 0.5 to 1.5 m below current ground level. The pattern of shallow groundwater flow is complex, but it is likely to be predominantly in the direction of the nearest surface water drain ('rhyne'). Deeper groundwater flow in bedrock is indicated to be in a northerly direction.
- 2.4.9 With regards to archaeology, recent investigations carried out along the route of the Gravity Link Road uncovered evidence of prehistoric activity in the form of a rectangular ditched enclosure which has been tentatively dated to the Early to Middle Bronze Age. The same investigations also uncovered several east to west orientated field boundary ditches from which a small quantity of Roman pottery was recovered and suggested the area was subject to intensive agricultural activity at the time. Additional excavations on the Site also uncovered a substantial curvilinear ditch dated by pottery to the Middle to Late Iron Age and a substantial masonry wall which through pottery finds has been dated to the Romano-British period, potentially to the 3rd or 4th century AD.
- 2.4.10 There are no listed buildings within the Site. The adjacent historic settlements of Puriton and Woolavington both contain churches which are medieval and Grade I Listed Buildings. Both villages also contain several Grade II Listed Buildings of more modern origin, most of which were originally farmhouses. There are two Scheduled Monuments in the wider area: Brent Knoll and Down End motte with two baileys.
- 2.4.11 The Site falls within three Landscape Character Areas: Levels and Moors (Levels), Lowland Hills (Polden Hills) and Levels and Moors (Clay Moors). To the south of the Site the ground begins to rise up more steeply to form the Polden Hills. From the Site centre, the Quantock Hills Area of Outstanding Natural Beauty (AONB) lie approximately 12km to the south-west of the Site and the Mendip Hills AONB approximately 14km to the north and north-east of the Site.
- 2.4.12 There are three solar farms located around and outside the Site boundary, to the west, north-west and north-east.
- 2.4.13 The Site is not within an Air Quality Management Area.
- 2.4.14 The site is not considered to be a sensitive area as defined by the EIA Regulations (Regulation 2).

3 The Proposed Development

3.1 Introduction and Plans

- 3.1.1 This chapter sets out the description of the Proposed Development, the Gravity Smart Campus and Community.
- 3.1.2 The Proposed Development is defined by a series of Parameter Plans to show the flexibility in the development consented by the LDO; as follows and provided in **Appendix 3.1a-g**:
- Land Uses;
 - Transport and Movement: Strategic Infrastructure;
 - Transport and Movement: Micromobility;
 - Building Heights;
 - Infrastructure and Utilities;
 - Strategic Landscape; and
 - Existing Buildings to be Demolished.
- 3.1.3 A Concept Plan has been prepared to provide a graphic representation of a scenario that could come forward within the Parameter Plans. This is provided at **Appendix 1.5**.
- 3.1.4 Whilst often an LDO is made prior to the commencement of any development on a Site, in this case there is already a planning consent that covers the majority of the Site. It is noted that the Gravity Link Road, approved by the 2017 Planning Consent, is due to be completed in October 2021. Gravity could implement further aspects of the 2017 Planning Consent once the LDO is made. This would be progressed through reserved matters applications and linked to existing conditions and obligations, should there be a strong market interest in those uses previously consented and in advance of the LDO being formally adopted and capable of being implemented in the timescales required.
- 3.1.5 On adoption, the LDO process will be implemented through a compliance process as set out within the LDO documentation, and aligned with those conditions and obligations, subject to market demands.
- 3.1.6 This chapter uses the Parameter Plans to describe areas of the Site.

3.2 Description of the Proposed Development

- 3.2.1 The description of development, is as follows:
- (a) *any operations or engineering works necessary to enable the development of the Site, including demolition, excavation and earthworks, the formation of compounds for the stockpiling, sorting and treatment of excavated materials, import of material to create development platforms, piling, and any other operations or engineering necessary for site mobilisation, office and worker accommodation, communications, drainage, utilities and associated environmental, construction and traffic management.*
 - (b) *the development of a smart campus including:*

- i. commercial building or buildings with a total Gross External Area of up to 1,000,000m² which would sit within current Use Classes E (a)- (g), B2, B8 and sui generis floorspace uses and*
- ii. a range of buildings up to 100,000m² within Use Classes C1, C2, E (a) – (g), F, B8, including restaurants / cafes, shops, leisure, education and sui generis uses; and*
- iii. up to 750 homes in Use Class C3.*

together with associated infrastructure including restoration of the railway line for passenger and freight services, rail infrastructure including terminals, sidings and operational infrastructure and change of use of land to operational rail land, multi-modal transport interchange, energy generation, energy distribution and management infrastructure, utilities and associated buildings and infrastructure, digital infrastructure, car parking, a site wide sustainable water management system and associated green infrastructure, access roads and landscaping.

Commercial Land Use

- 3.2.2 The LDO will grant consent for a total of 1,000,000m² gross external area (GEA) of use classes E (a) – (g) (commercial, business and service), B2 (general industrial), B8 (storage or distribution) and Sui Generis.
- 3.2.3 The LDO will facilitate the creation of a minimum of 4,000, and up to approximately 7,500, jobs which will be delivered primarily from the Commercial land uses proposed within the LDO. However, jobs will also be generated through other land uses including leisure, sport, hotel, education and community uses.
- 3.2.4 The LDO is market-led and therefore flexibility is being sought for the commercial land use classes across the Site. There is the potential for one operator to occupy the whole of the Advanced Manufacturing part of the Site (orange hatched on the Land Uses Parameter Plan in **Appendix 3.1a**) with an Advanced Manufacturing facility. Alternatively, this part of the Site could consist of a series of smaller units with several operators.
- 3.2.5 Commercial use E (a) – (g) is also proposed within the green hatched area on the Land Uses Parameter Plan in **Appendix 3.1a**. Commercial land uses will come forward that will complement and sit alongside other land uses proposed within that area.
- 3.2.6 Commercial (employment generating) uses will be integrated within residential and leisure areas to encourage an integrated community and a live-work environment. These are the blue and purple hatched on the Land Uses Parameter Plan in **Appendix 3.1a**.

Rail Land Use

- 3.2.7 Rail land use relating to both passenger and freight rail, associated terminals and infrastructure is shown in the orange hatched area on the Land Uses Parameter Plan in **Appendix 3.1a**. The Parameter Plan shows a corridor for the rail infrastructure to allow for configuration of the infrastructure to accord with the requirements of an operator(s).
- 3.2.8 Passenger rail will enter the north west corner of the Site, and pass down the western side of the Site, terminating in a passenger station in the south west corner of the orange hatched area.
- 3.2.9 Freight rail will also enter the north west corner of the Site and then occupy the northern part of the orange hatched area to serve this commercial land use. It is anticipated that sidings will be provided at this location, along with associated infrastructure including mobile gantry

cranes and roads. The Building Heights Parameter Plan (**Appendix 3.1d**) shows a maximum height of 11 metres in this area to accommodate gantry cranes and associated infrastructure.

- 3.2.10 There is also the potential that the rail bridge over the M5 motorway will require replacement to facilitate the restoration of passenger and freight rail provision to the Site.

Sui Generis

- 3.2.11 Sui Generis land uses could also come forward within the orange and green hatched areas on the Land Uses Parameter Plan in **Appendix 3.1a**. An example of this use class could include an electric vehicle charging forecourt.

Sport and Leisure

- 3.2.12 The Proposed Development provides several opportunities for play areas, sport and recreation, including public sport, children's equipped play and teen provision. Opportunities for provision include:
- The pitches and facilities associated with the blue hatched area in the south west corner of the site, shown as blue hatched on the Land Uses Parameter Plan in **Appendix 3.1a**; and
 - Leisure use such as gyms, cafes, community facilities, nursery and residential accommodation across the blue and green hatched areas.
- 3.2.13 The scope of the provision will of course be determined by future occupiers and provision may be driven by meeting the needs of the workforce on the campus. Opportunities to integrate and offer services to the Site and the wider community are captured in the Design Guide to enhance corporate environmental and social governance and to ensure community cohesion.
- 3.2.14 The blue and green hatched area also includes provision for community facilities under use class F, for example small shops, a hall or meeting place or outdoor sport and recreation use.

Education and Training

- 3.2.15 Education and training uses will be brought forward to respond to operator(s) demand and will be linked to the employment uses and workforce on Site, for example a campus training facility to deliver research, development and training specific to the demands of occupiers including the potential need for start-up and small business space. If demand requires, a nursery/day care facility will be provided.
- 3.2.16 If there is demand for early years, primary and/or secondary education as a result of the residential element of the Proposed Development, contributions to education (and health) will be through CIL, which will be reviewed and confirmed through the Compliance Form process (see Chapter 4 Mitigation Checklist in the Design Guide).

Hotel

- 3.2.17 The green hatched zone includes provision for a hotel, which would be provided to serve the business and operational needs of the Gravity Smart Campus and Community.

Residential and Associated Community Uses

- 3.2.18 Up to 750 dwellings will be provided to serve the Gravity Smart Campus and Community and to provide capacity in the housing market to support the jobs on Site and reduce impacts on

the local housing market. These homes will be tied to Gravity and will not be open market housing.

- 3.2.19 The homes will be designed to fit within the ethos of the smart campus, and will offer high specification accommodation that achieves net zero carbon commitments, reduced parking, and electric vehicle (EV) charging, supporting attractiveness to those who wish to adapt to a lower carbon lifestyle and achieve a better work life balance. The homes will be designed to attract and retain a skilled workforce and be targeted at Gravity's young professionals and key workers. They will therefore not compete with the open market housing market in nearby communities being of a style and nature to respond directly to the demand created by Gravity, rather than to respond to local market demand. The priority for local workforce development and sustainable connectivity will also support that the local community secures work opportunities on Site.
- 3.2.20 A Housing Statement for any phase of the Proposed Development which includes housing, setting out the number of dwellings, tenure/type of housing to be delivered, justification for requirement and location within the Site. This is secured through the Compliance Form process (see Chapter 4 Mitigation Checklist in the Design Guide).
- 3.2.21 Residential land uses are proposed within the green and purple hatched areas on the Land Uses Parameter Plan (**Appendix 3.1a**) and a balanced and appropriate mix of dwelling types and tenures will be provided to meet identified occupier needs.
- 3.2.22 Campus community uses are also expected to be brought forward within the green and purple hatched areas under the Use Class F. Examples are: a small shop, community space / halls, and will be provided to serve the Gravity Smart Campus and Community to meet on-site needs.
- 3.2.23 Wider community and locality uses are also proposed in the blue hatched area, such as for provision of a new 37 Club, which could be supported by other uses to support viability including a café, playground, cycle hire.
- 3.2.24 Sports pitches and other outdoor recreation is proposed and this will be confirmed by the future occupiers to meet workforce needs and for them to consider opportunities to open facilities to wider communities.

Energy Generation, Distribution and Management Infrastructure

- 3.2.25 The green hatched area on the Land Uses Parameter Plan (**Appendix 3.1a**) also includes energy generation land use. This energy generation will be designed to be compatible with surrounding uses in this area and could, for example, include roof-mounted photovoltaic solar panels and ground source heat pumps.
- 3.2.26 The lilac hatched area labelled 'Energy Distribution and Management Infrastructure' will include a connection into the overhead power lines via a substation to provide an energy supply to the Site, and its associated infrastructure. The Proposed Development will also include infrastructure to assist with site-wide energy management.

Landscaping and Green Infrastructure

- 3.2.27 The Proposed Development is underpinned by a Strategic Landscape Parameter Plan (**Appendix 3.1f**) which includes the retention, reinforcement and evolution of the existing landscape framework.
- 3.2.28 The Strategic Landscape Parameter Plan allocates areas on the Site for greenspace, structural tree and woodland planting, the Gravity Park (see below), placemaking nodes, landscape bund, planting and water attenuation areas. These areas are primarily located on

the edges of the Site but are substantial areas of greenspace, often exceeding 100 metres in width.

- 3.2.29 The Proposed Development includes a variety of pocket gardens and parks, offering outdoor recreation on the campus for the workforce and its residents and community. The land shown as blue hatched on the Land Uses Parameter Plan (**Appendix 3.1a**) located in the south west corner of the Site will accommodate buildings on only up to 50% of the zone area, with the remainder being blue and green infrastructure, a tree nursery, community uses, sports, leisure and associated infrastructure such as rail, road and cycle routes.
- 3.2.30 Within the 'Development zone' surrounded by a hatched line in the northern part of the area hatched orange on the Land Uses Parameter Plan, up to 50% of this zone will accommodate buildings and the remaining 50% will be associated infrastructure but will also incorporate some green infrastructure.
- 3.2.31 A 'Green Edge' (an east to west landscape corridor) will be provided along Woolavington Road to provide landscaping adjacent to the road and to achieve a campus environment and provide a biodiversity corridor. Several 'placemaking nodes' (Central Park, Gravity Green and Gravity Plaza) will be incorporated within the green hatched area and landscaped as appropriate. These are considered important focal points for this area that the development will respond to appropriately through landscape and built form. The location of these placemaking nodes is not fixed but illustrative locations are shown on the Strategic Landscape Parameter Plan in **Appendix 3.1f**.
- 3.2.32 Within the rail corridor, trees will be retained where possible, subject to the rail alignment and other necessary associated infrastructure. The existing landscape bund along the western Site boundary will be retained with existing trees also retained where possible, and with structural tree and woodland planting incorporated to the west of the bund.
- 3.2.33 A north to south biodiversity corridor will be achieved in the 400kV corridor. Landscaping within the Site will incorporate street trees and rhynes and be informed and shaped by the Design Guide. Opportunities to strengthen landscaping and improve the setting of leisure facilities such as the fishing lakes will be incorporated in the Design Guide.
- 3.2.34 Paths on Gravity land will be Permissive Pathways rather than Public Rights of Way. New pavements constructed on the existing highway land will become part of the highway owned and maintained by the Local Highways Authority.

Layout

- 3.2.35 As shown on the Land Uses Parameter Plan (**Appendix 3.1a**), the layout of the Proposed Development is designed to provide areas for commercial, energy distribution/management infrastructure, residential and associated community uses, leisure, education, hotel, energy generation, sport and leisure and community facilities.
- 3.2.36 Open space and biodiversity zones, including surface water attenuation features, watercourses, woodland, hedgerows and trees is also allocated on the Land Uses Parameter Plan, as well as a rail corridor for freight, passenger and associated infrastructure, and a passenger station.

Building Heights

- 3.2.37 Building Heights are shown on the Building Heights Parameter Plan (**Appendix 3.1d**).
- 3.2.38 The Building Heights Parameter Plan provides for buildings of up to 35 metres ridge height in the orange hatched area, scaling down to a maximum 23 metres ridge height in the green

hatched area, 12 metres ridge height in the purple hatched area and 11 metres ridge height in the blue hatched area.

- 3.2.39 Within the Advanced Manufacturing zone (shown orange hatched on the Land Uses Parameter Plan), an additional 25 metres is proposed for stacks relating to the end-use. Whilst it is most likely that an additional 10 metres is likely to be sufficient, an additional 25 metres is included as it is understood some commercial uses could require this height.
- 3.2.40 Flues may also be required in relation to Energy Generation land use and an additional 3 metres above adjacent building height is therefore required and shown on the Building Heights Parameter Plan. The height and number of flues associated with the Energy Generation will be determined by dispersion modelling.
- 3.2.41 Adjacent to the village of Puriton, in the area shaded pink on the Building Heights Parameter Plan, the ridge height is shown to be up to 11 metres, however, up to 50% of this area will accommodate buildings, and the remainder will be associated infrastructure such as green infrastructure, community uses, sports, leisure or associated infrastructure such as roads, footpaths and cycle routes.
- 3.2.42 With regards to finished floor levels, on the parts of the Site within the ROF fence, development will be from a finished floor level of 6.5 metres AOD. Outside the ROF fence, will be from up to 2 metres above existing ground levels, and be subject to an earthworks and foundation assessment.

Water Bodies and Drainage

- 3.2.43 The Site currently includes waterbodies and drainage systems. The Strategic Landscape Parameter Plan shows the existing water bodies, rhynes and Internal Drainage Board (IDB) rhynes that will be retained. These are primarily the fishing lakes on the eastern edge of the Site and the network of rhynes within the greenspace in the east, north and west parts of the Site.
- 3.2.44 The existing IDB rhynes in the north east and south west of the Site will remain in situ, as indicated on the Infrastructure and Utilities Parameter Plan. There is also an existing reedbed system in the north of the Site, which runs north to the Huntspill River which will also be retained.
- 3.2.45 In addition, there are two water attenuation areas that are to be delivered as part of the Gravity Link Road, in the south west part of the Site. A further area of water attenuation will be provided in the north of the Site, in the vicinity to the southern end of the existing reedbed system.
- 3.2.46 The existing rhynes, reedbeds and water bodies to be retained, as well as other rhynes to be incorporated, will be included in the site-wide Drainage Strategy which has been prepared for the LDO. This Strategy will also incorporate the use of sustainable drainage systems (SuDS) which will also allow for ecological and amenity benefits.

Operational Waste

- 3.2.47 Schedule 4 of the EIA Regulations states that this ES should include a description of the development, including *“an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases”*.
- 3.2.48 An Operational Waste Management Strategy (OWMS) has been prepared for the operation phase to support the LDO and is provided at **Appendix 3.2**. This Strategy examines the relevant waste policy that needs to be considered and estimates the levels of waste expected

to be generated, in addition to proposing waste management strategies through the operational phases of the Proposed Development.

3.2.49 The Strategy seeks to minimise the negative environmental and carbon impacts associated with resource extraction, use and disposal through lifecycle analysis and circular economy thinking. Further information, including regarding the Gravity 4R's approach (Recover, Recycle, Repurpose and Reuse) can be found in the OWMS at **Appendix 3.2**.

3.2.50 Construction waste arisings will be covered in **Chapter 4**.

Access and Movement

3.2.51 Access and movement is shown on the Transport: Micromobility and Transport: Strategic Infrastructure Parameter Plans in **Appendices 3.1b & c**.

3.2.52 Flexibility is required for the internal transport, road and micromobility connections. As shown on the Parameter Plans, these locations are not fixed and will be located to respond to operator(s) requirements.

3.2.53 Within the movement hierarchy, pedestrian, cycle and other micromobility modes will take precedence. The Micromobility Parameter Plan shows a network of micromobility routes within the southern part of the Site. These will comprise:

- **Key Pedestrian/Cycle Connections** – Pedestrian and cycle connection that provide strategic connections within the Proposed Development;
- **Shared Pedestrian and Cycle Paths** – Paths that allows for simultaneous pedestrian and cycle movements. These would not include micromobility modes as set out below and are likely to be within development parcels in low key streets / spaces;
- **Micromobility Routes** – Designated routes for all forms of micromobility including cyclist, but also e-scooters, e-bikes, shared bikes and all other small, lightweight vehicles operating speeds typically lower than 15mph; and
- **Mobility Route** – Route with sustainable modes of travel; route to integrate into other street type(s); could include, for example, autonomous vehicles, electric scooters or bikes.

3.2.54 In addition to the above, the Village Enhancement Scheme is now consented and will be completed in 2022. This provides an off-road pedestrian and cycle route between the villages of Puriton and Woolavington, connecting through the Site.

3.2.55 The Transport: Strategic Infrastructure Parameter Plan shows the more strategic access and movement elements across the Site, which will comprise:

- **The Gravity Link Road** — construction of which is due to be completed in October 2021;
- **Primary Road and Main Access** – which will be from the Gravity Link Road in the south-west corner of the Site and include associated pavements / cycle paths and routes as well as drainage as part of previous planning consent;
- **Primary Road Corridor** – will be subject to centre line deviation limits of +/- 50 metres, which will accommodate HGV movements. It will also be used by other vehicles and have cycle and pedestrian connections alongside. It will include a green cross section to accommodate significant planting and drainage;

- **Secondary Access** - which could be provided from Woolavington Road along the southern boundary of the Site at several locations. This also includes the existing roads leading to the ROF site access, which will be retained;
- **Access from the east** - A further access point will be available from the B3141 Causeway to the east for pedestrian and cycle use only, and also emergency and operations use when required;
- **Indicative vehicular crossing** – Crossing points will be provided at various locations on all major routes on desire lines to ensure that active travel users are able to easily cross these routes and create a permeable network of active travel routes. Again, to respond to the required flexibility, indicative locations are shown;
- **Transport Corridor** – will be subject to centre line deviation limits of +/- 30 metres, and will be mixed use streets through the centre of the Proposed Development; they will have a higher degree of enclosure, have animated frontages where possible and public realm; and
- **Rail corridor** - Restoration of the railway line for both freight and passenger use could provide access by rail from the north-west of the Site to the mainline between Bristol and Exeter. A corridor for the rail route is provided on the Parameter Plans to enable the exact routing within the Site to be developed to respond to occupier(s) demand.

3.2.56 The Proposed Development will also include 'mobility hubs', which will allow people to switch between different modes of travel. Mobility hubs will typically include at least 2-3 modes of travel with at least one of them more strategic in nature, most likely located near to the passenger rail station, bus stop/interchange and main access to the Site in the south west corner, and will also include associated services at the hub.

Car Parking

- 3.2.57 Sustainable travel modes will be encouraged as much as possible and there will be a limited number of cars circulating within the Gravity Smart Campus and Community. Multi-storey car parking (MSCP) could be provided together with at-grade surface car parking within the area hatched blue on the Land Uses Parameter Plan, for people working at Gravity. These are expected to be located close to the Site entrance to limit traffic movements within the site and prioritise internal movement by sustainable modes. Temporary surface car parking may be provided prior to the availability of the MSCPs.
- 3.2.58 Car parking for people living at the Gravity Smart Campus and Community will be provided at a rate of no more than one space per dwelling with managed additional parking provided for visitors accessing the onsite facilities.
- 3.2.59 Heavy Goods Vehicle (HGV) parking associated with the core employment uses could be provided within the orange hatched area on the Land Uses Parameter Plan.
- 3.2.60 Electrical vehicle charging will be provided to encourage the transition to electric vehicles.

Sustainability

- 3.2.61 Sustainability is at the heart of the design and development of Gravity. Ambitions to achieve regeneration and place transformation are set out in the Clean and Inclusive Growth Strategy which was developed taking into account a full review of the UN Sustainable Development Goals. The review resulted in the determination of key themes and priorities to shape the approach to the LDO.

- 3.2.62 Gravity will host and support companies who are committed to making a difference socially, economically, and environmentally, driving the UK's transition to a cleaner economy.
- 3.2.63 Specific measures relating to sustainability are detailed further in the technical **Chapters 7 to 16**.

3.3 Strategies supporting the Proposed Development

- 3.3.1 There are a number of Strategies that shape the ambition and approach to the LDO including the Gravity Clean and Inclusive Growth Strategy and Environmental, Social & Governance (ESG) Policy, and technical documents which inform the design and implementation of the proposed development including the Digital Vision, an Energy Strategy, a Water Strategy and a Utilities Strategy.
- 3.3.2 The Clean and Inclusive Growth Strategy, available at www.thisisgravity.co.uk, creates a route to delivering clean and inclusive economic growth at Gravity, creating a smart campus and integrated community that supports the 4th Industrial Revolution. Key themes are established, from an evaluation of the UN Sustainable Development Goals relevant to Gravity, with over 50 priorities being defined to help translate ambition into strategy and delivery. The Gravity ESG Policy, available at www.thisisgravity.co.uk, flows from this and links to a monitoring and reporting regime to communicate progress and outcomes. Early work on place shaping will seek to enable an integrated live, work, play community with recognition of wellbeing and mental wealth as a valuable asset, and to enhance self-awareness within the future workforce.
- 3.3.3 The Digital Vision, available at www.thisisgravity.co.uk, creates a route map to underpin transformation and the step change needed to attract high value occupiers and invest in infrastructure fit for the future, aligned with national and local policy and strategy objectives to transform the way we work and operate.
- 3.3.4 The Energy Strategy, submitted with the LDO, demonstrates that adequate energy provision and connectivity is planned to support the delivery of Gravity and the scenarios to be set out and consented within the Gravity LDO. The Energy Strategy includes details on associated phasing, management and implementation plans which cover any transitional and short-term solutions with suggested five-year time horizons, considering potential uses / demands on Site and evolving solutions without being technology specific.
- 3.3.5 The Proposed Development will also include a Gravity Skills Charter, submitted with the LDO, to foster social value during construction and in operation, through local employment opportunities, local training and workforce development, improving resilience, young people's engagement and the creation of pathways to work, apprenticeships, and improved choices to enable local connectivity from the community to the opportunities provided by Gravity.
- 3.3.6 Similarly, a Gravity Business Charter, submitted with the LDO, will seek to stimulate business and supply chain opportunities.
- 3.3.7 An investment plan is in preparation, collaboratively between Gravity, SDC and EZ partners which will inform the implementation process. Linked to a separate funding agreement this will inform phasing of infrastructure and priorities for investment of business rates to enable effective implementation and site mobilisation to ensure delivery as a priority, to maximise the benefits that Enterprise Zone status can deliver for the locality.

3.4 Embedded Mitigation

- 3.4.1 Embedded mitigation has been provided in the technical **Chapters 7 to 16** to reduce environmental effects. This is secured through the Mitigation Checklist in Chapter 4 of the

Design Guide. Some of the key embedded mitigation which forms part of the Proposed Development is:

- A Framework Demolition and Construction Environmental Management Plan (FDCEMP) to mitigate effects during the demolition and construction phase;
- All flood vulnerable development will be located outside of the modelled flood extents, as inherent mitigation against tidal flooding;
- A surface water management strategy to control outflows to receiving systems and manage surface water sustainably within the Site;
- Vegetation retention, tallest built form located in the central part of the Site, making the most of existing landscape features, Woolavington and Puriton Edge, Woolavington Road green edge, landscape buffer, structural tree planting, community open spaces, east-west landscape corridor; and
- A pre-commencement programme of trial trenching will be undertaken to further establish the presence and significance of any as yet unknown archaeological remains.

3.5 Consideration of Alternatives

Overview

- 3.5.1 Regulation 18(3)(d) of the EIA Regulations requires an ES to include "a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment". This is expanded at paragraph 2 of Schedule 4 of the EIA Regulations which requires an ES to include "a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".
- 3.5.2 This legal requirement is expressed in very general and high-level terms, requiring only the inclusion of "reasonable" alternatives and an "indication" of "main" reasons. Although a full description of alternatives and a full assessment of their likely environmental effects are not required, sufficient detail should be provided to allow for a meaningful comparison between the alternatives and the Proposed Development.
- 3.5.3 It is a matter for the developer to decide whether to consider alternatives and which alternatives it intends to consider. The EIA Regulations do not expressly require that an applicant considers alternatives, although it is widely encouraged at the policy level, both European and domestic, and is an implicit feature of the EIA Regulations.
- 3.5.4 The consideration of alternatives in this ES complies with the requirement for the inclusion of reasonable alternatives and has regard to the guidance in the PPG on EIA which states (similarly to the EIA Regulations) *"Where alternative approaches to development have been considered, the Environmental Statement should include a description of the reasonable alternatives studied which are relevant to the Proposed Development and its specific characteristics and provide an indication of the main reasons for the choice made, including a comparison of environmental effects"*.
- 3.5.5 The following provides an outline of the reasonable alternatives considered in relation to the Proposed Development and the main reasons for choosing the Proposed Development in preference to them, as well as a comparison of environmental effects.

- 3.5.6 It should be noted that, given the flexibility being sought through this LDO, information provided within this 'Consideration of Alternatives' section is proportionate to the level of detail on the Parameter Plans.

No Development

- 3.5.7 Bridgwater Vision sets out a long-term strategy for the town until 2060, and identifies the Site as a transformational opportunity for the area. This is important to provide opportunities for permanent employment beyond the temporary construction jobs at Hinkley Point C and to respond to the economic restructuring in the area and the priorities to address and reduce out commuting, and to increase the proportion of higher value employment.
- 3.5.8 The Council's Corporate Strategy 2020 – 2021 identifies Growth & Infrastructure as one of the three priority themes to deliver their corporate objectives. In particular, the priority to grow the economy of Sedgemoor will be achieved by ensuring supply of employment land, encouraging businesses to locate to Sedgemoor and working to increase the skill level of the workforce.
- 3.5.9 The Council's Economic Development Strategy 2020 – 2050 explains that by 2050 Sedgemoor will be a clean growth and energy link on the M5 "Innovation Highway" which connects an environmental, health and marine digital hub to the south and a high-tech transport, cybersecurity, health, and data-driven hub to the north. The Strategy identifies the prominence of the Gravity site as the key project within Sedgemoor District and states that it offers further long-term opportunity for the transformation of Sedgemoor's economy. Importantly the Strategy also notes that Gravity will create an inclusive environment.
- 3.5.10 The Sedgemoor Core Strategy was adopted in September 2011 and, although now superseded by the new Local Plan, included an allocation for an 'Energy Park' on the Gravity site (Policy P1 Bridgwater), with priority given to industrial uses including renewable or low carbon energy generation and other energy-related or complementary uses, including green technologies, supply components and support services. In order to elaborate and provide greater detail on policies within the Core Strategy relating to the 'Energy Park', SDC also adopted the Puriton Energy Park SPD in March 2012.
- 3.5.11 Prior to determination of the Huntspill Energy Park application (The 2013 HEP Application) the full 616 acre Site secured Enterprise Zone (EZ) status in April 2017. The EZ came into existence on the 1 April 2017 and runs for 25 years until 2042. As such the priority and importance of enterprise zones are embedded as growth hubs are embedded within the Heart of the South West Local Enterprise Partnerships (HotSWLEP) policies and plans.
- 3.5.12 Planning permission was granted for the HEP in 2017 (The 2017 Planning Consent) therefore given there is already a planning permission in place to develop the Site, no development is not a reasonable alternative. No development would fail to deliver the agreed ambition of the enterprise zone to attract international investment, in conjunction with the councils and the HotSWLEP.
- 3.5.13 In addition, it does not accord with Sedgemoor District Council's desire to see the site developed, nor does it accord with policy and would not help to meet the employment and wider economic needs of the area. In addition, there is a strong driver to accelerate and transform the economy through enabling a smart campus whilst simultaneously creating a new commercial environment geared to cutting greenhouse gas emissions, creating good jobs, integrating low carbon homes and realising positive social outcomes for local communities.

Alternative Sites

- 3.5.14 As noted above, the Site is highlighted in several Local Development Plan documents and is within the control of the Developer, therefore no other sites have been considered.

- 3.5.15 In addition, the 2013 HEP Application made use of a brownfield site, which has subsequently been remediated through the Remediation Planning Consent and a new access provided by way of the Gravity Link Road. Use of an alternative site would not have led to the former ROF site being remediated and would not capture the potential boost to the local and national economy through bringing the Site back into beneficial use.
- 3.5.16 The Site has been remediated to a commercial use standard and it would be unlikely that it could be economically further remediated to be returned to a more natural state, therefore using this Site for the Proposed Development is a logical option that can be taken forward by the Developer and in accordance with policy.

Alternative Consenting Mechanisms

- 3.5.17 Consideration has been made to progressing a series of outline and reserved matters applications for development at the Site.
- 3.5.18 However, the following limitations have been identified for the 2017 Planning Consent:
- The approach was based on more traditional planning and economic development rather than a more proactive and agile planning strategy that would offer a simplified planning regime, to attractive international business, that would be needed to align with the EZ status;
 - It sets out an approach that would secure a large-scale industrial park underpinned by fossil fuels that does not align with the Clean and Inclusive Growth agenda, the Government's Industrial Strategy or the response to climate change;
 - The masterplan attached to the consent seeks to secure a traditional plot based approach rather than a cohesive campus;
 - The scale and range of uses is not consistent with the current global market needs in a post Brexit context, specifically in terms of accommodating large scale advanced manufacturing;
 - A significant part of the site is only safeguarded for development and does not benefit from consent;
 - Land safeguarded for energy generation has not attracted market interest and instead the energy strategy for the site in partnership with E.ON will focus on a low carbon site wide solution that does not require large allocations of land for generation;
 - As such there is potential for the delivery of a greater development area and the potential for securing more and higher value jobs and businesses;
 - The extent of the planning consent does not align with the extent of the full Enterprise Zone. The consent does not provide a simplified form of planning which could enable business rates generation and retention; and
 - No rail restoration was included previously, and no provision made to include homes to facilitate more sustainable lifestyle choices.
- 3.5.19 As a consequence, Gravity recommended the preparation of an LDO on the basis that their function is to accelerate delivery and attract international tenants through a simplified and agile planning process which can provide greater flexibility and in turn be proactive in securing investment and maximising economic benefits. SDC subsequently agreed through an Executive decision in July 2020 that Gravity will be taken forward through an LDO.

- 3.5.20 LDOs are a positive planning tool and a marketing tool for the locality and site. They create certainty in the planning environment for investors and potential occupiers, and thereby make inward investment more attractive. They embody a fundamental shift on the part of local authorities from waiting for the market to come to them with a proposal, to initiating development by granting permission for the kind of development that they want to come forward on a site.
- 3.5.21 In addition, the function of an LDO is to accelerate delivery. They are designed to enable the implementation of a local solution by simplifying planning and providing local authorities with a flexible tool to address particular circumstances.
- 3.5.22 In comparison to the outline and reserved matters approach, an LDO will save time and reduce the administrative planning requirements for SDC. It will also enable the economic benefits of the Site to be expedited.
- 3.5.23 The preparation of this ES for the LDO has allowed for likely significant effects for the Proposed Development as a whole to be considered and appropriate mitigation for the whole Proposed Development to be identified.

Alternative Forms of Development

Introduction

- 3.5.24 This section sets out the alternatives considered for the Proposed Development as the design has progressed, in relation to types and quantum of uses. It also outlines key design considerations in relation to the Parameter Plans. The key alternatives considered are outlined, and explanations are provided in relation to decisions made along with a comparison of environmental effects.
- 3.5.25 Alternatives and flexibility within this mix were considered in relation to commercial (employment), education and residential provision. These are further explained below.
- 3.5.26 All other potential uses, such as leisure, hotel, sport, community facilities, will be brought forward in response to demand arising from the occupier(s).
- 3.5.27 The 2017 Planning Consent included land safeguarded for energy generating uses, leisure use and the re-instatement of a rail head. The leisure uses and rail-head reinstatement are retained and refined in the LDO, however the energy generating uses have been removed as the technology proposed at that time (Energy from Waste, a Peaking Plant and a Biomass Combined Heat and Power facility) is no longer compatible with Gravity's Clean and Inclusive Growth Strategy.
- 3.5.28 The Parameter Plans have been developed to respond to emerging environmental and other constraints and opportunities associated with the Site. They show how the largest facility that has been identified, through market enquiries, can be accommodated on the Site. This therefore ensures that the greatest potential environmental effects are considered within the ES. It is considered that the largest facility will give rise to the greatest environmental effects, including for the following reasons:
- The tallest building will have the greatest Zone of Theoretical Visual Influence, which has been assessed in the landscape and **Chapter 14: Landscape and Visual**;
 - The largest footprint will have the greatest impact on the existing Site drainage network, which has been assessed in **Chapter 13 Water Environment**;
 - Whilst the largest building may not necessarily generate the greatest number of jobs (and therefore people movements), the land use mix has sought to identify the greatest

number of jobs arising, assessed in **Chapter 7 Economics** and **Chapter 8 Health, Social and Wellbeing**.

LDO Boundary

- 3.5.29 The 2013 planning application boundary comprised a total area of 219.5 ha (542 acres) including the access road area which lies outside of the Enterprise Zone area.
- 3.5.30 The Enterprise Zone boundary comprises an area of 249.4 ha (616 acres) and the overall LDO area, including all land in the control of This is Gravity Ltd, totals 263 ha (650 acres). This includes the additional of the Gravity Link Road and fishing lakes for placemaking, and also land for reinstatement of the rail line.
- 3.5.31 The LDO boundary is therefore wider than the EZ boundary. The additional land is shown by the blue, green and purple hatched area on the Land Uses Parameter Plan in **Appendix 3.1a**. Previous baseline information has been updated to include all land within the LDO boundary.
- 3.5.32 The additional environmental effects of extending the Site area have been assessed in the ES. These are primarily linked to loss of trees and hedgerows, bringing development closer to the existing settlements of Puriton and Woolavington, a minor adverse effect on the setting of the Grade II listed Manor Farmhouse in Puriton and a potential impact on buried archaeological features. None of these effects have been identified within the ES as being significant.
- 3.5.33 However, the inclusion of this land will also enable the co-location of additional land uses including sports and leisure, residential, education and community uses alongside the commercial uses, to provide an integrated Smart Campus.

Land Use

Commercial

- 3.5.34 As a result of the 2017 Consent, more than 4,000 jobs would be provided. The Proposed Development will generate up to 7,500 jobs which reflects the transition to a 24/7 smart campus with potentially three shift patterns per day.
- 3.5.35 The LDO is market-led and therefore flexibility is being sought for the employment land use classes and building heights across the Site. There is the potential for one end user to occupy the whole of the hatched yellow part shown on the Land Uses Parameter Plan in **Appendix 3.1a**, alternatively this part of the Site could consist of a series of smaller units operated by different occupiers.
- 3.5.36 The broad location of the commercial land use within the Site has remained consistent with where it was proposed to be located in the 2017 Planning Consent: on the site of the former ROF, on what is now the central and northern part of the Site, adjacent to the rail link. Commercial land use in this area is likely to be larger scale, such as an Advanced Manufacturing (AM) facility.
- 3.5.37 Recognising the need for a market-led approach, an AM Study was undertaken in Autumn 2020, which looked at large scale AM facilities worldwide, such as gigafactories, electric vehicle and alternative fuel assembly plants, additive manufacturing, agritech, verticulture, hydroponics and data centres. This Study started to draw out the international demand and requirements for larger AM units, which started to inform the team's understanding of the types of occupier the Site might need to accommodate to achieve its potential as a UK and international leading clean growth smart campus.
- 3.5.38 The AM study was presented to the Gravity Delivery Group and the slides are available on the [Thisisgravity.co.uk](https://thisisgravity.co.uk) website.

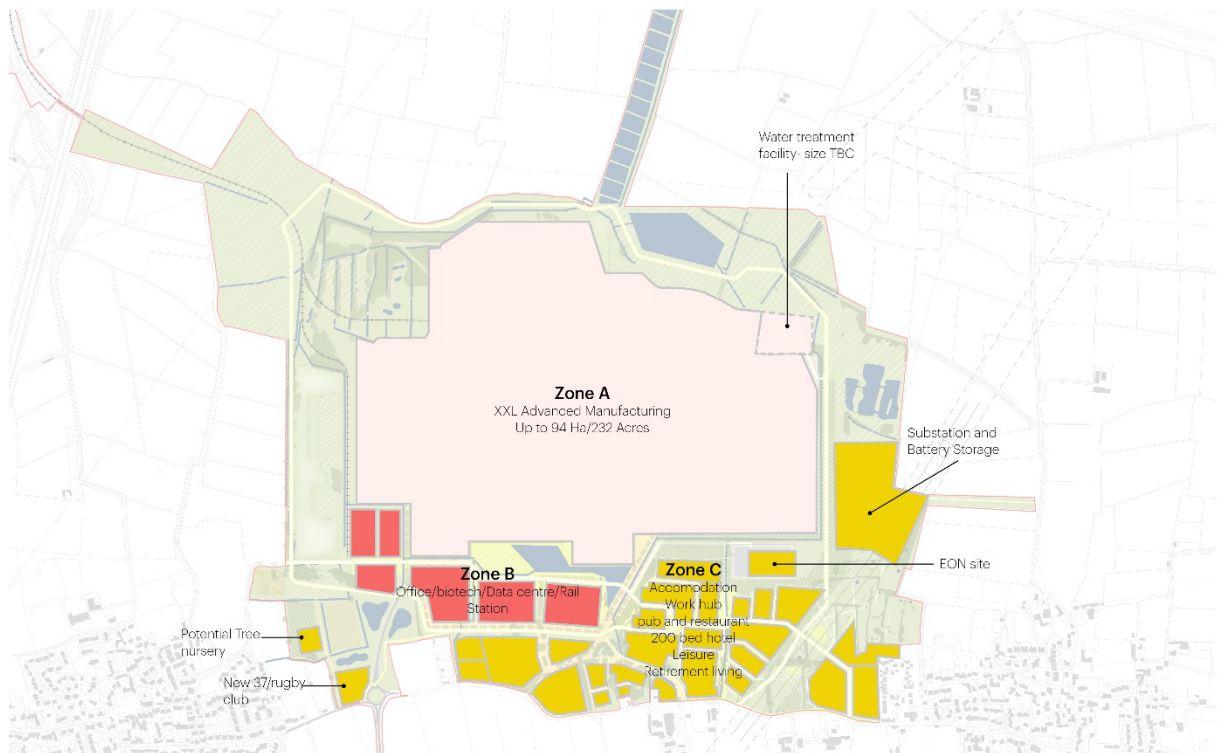
3.5.39 This AM study also identified maximum build footprint and building height for the environmental assessment for the LDO.

3.5.40 Examples of precedents reviewed to help determine the largest plot sizes include:

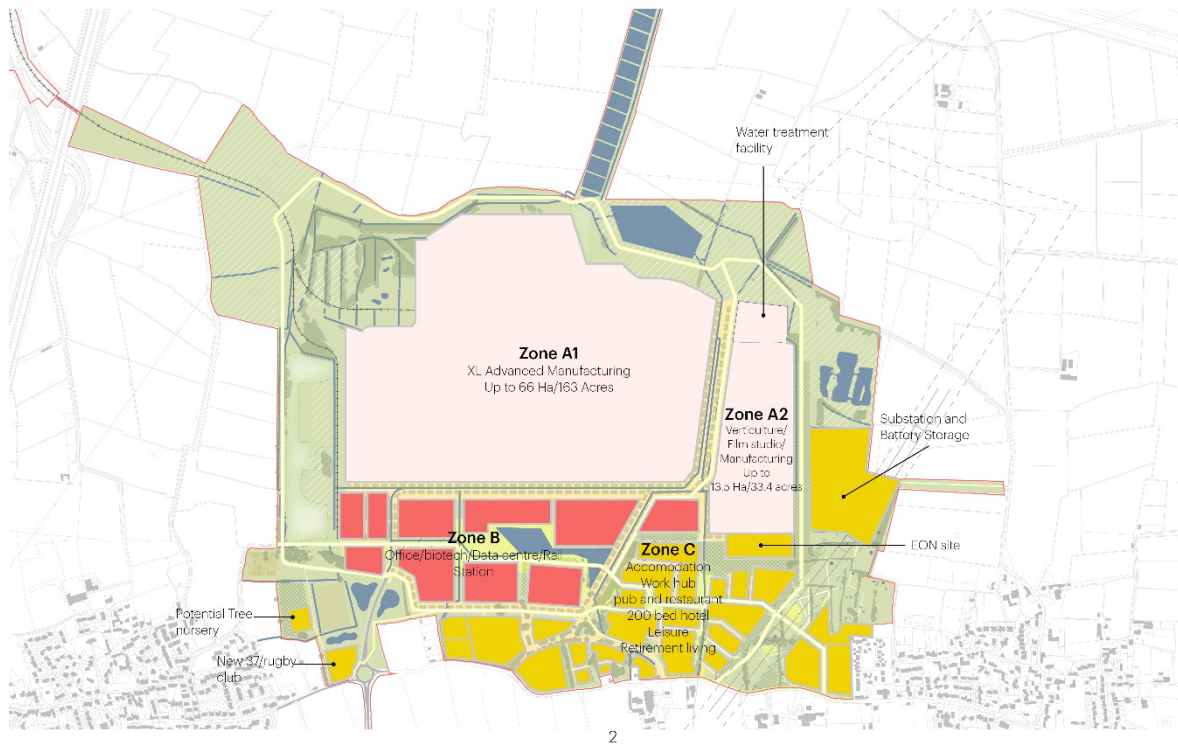
- Tesla Gigafactory 3, China, 4.5m sqft building footprint, 3 storeys, 30m total height;
- Tesla Gigafactory 1, Nevada, 1.9m sqft building footprint, 3 storeys, 30m total height; and
- Tesla Gigafactory 4, Berlin (Ph1), 3.2m sqft building footprint, 3 storeys, 24.3m total height.

3.5.41 Different land use scenarios were considered, based on current market interest. A range of occupier requirements ranging from a known Gigafactory requirement through to a mix of smaller units which reflected known market requirements at the time were considered. This was refined down to three scenarios, as follows:

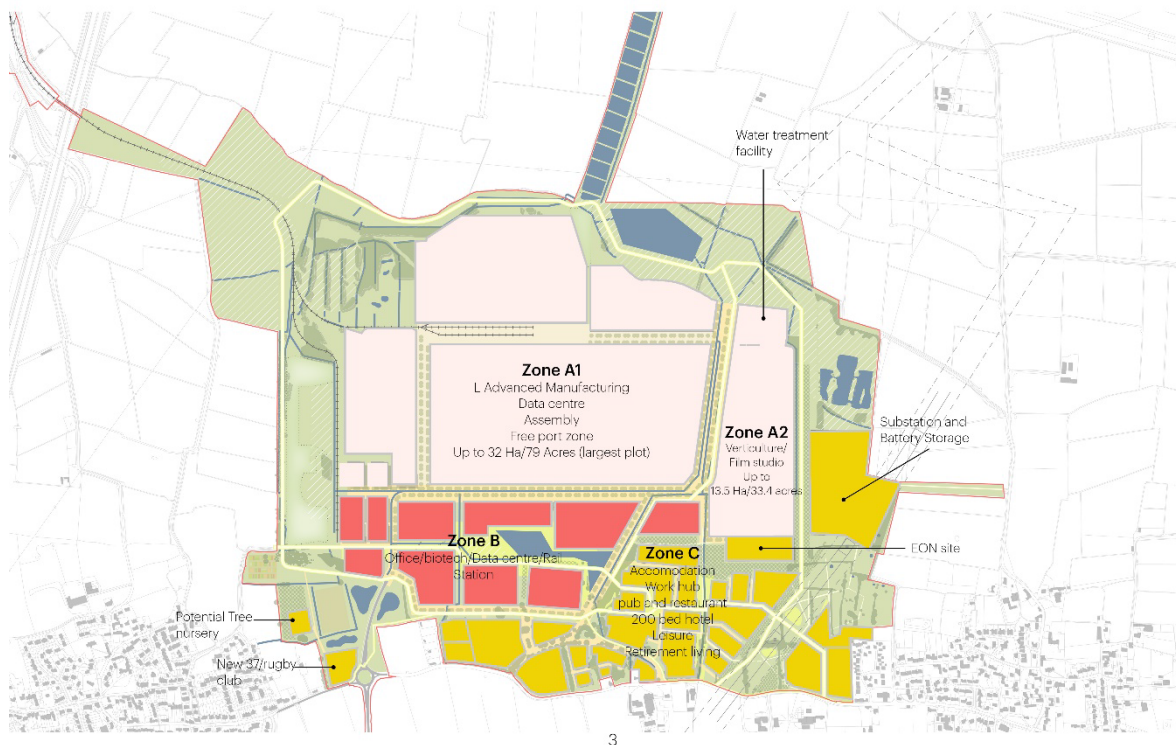
- **Scenario 1** - based around securing a very large AM facility that takes up the majority of the Site's commercial development area.



- **Scenario 2** - based around securing a large AM facility that takes up a large proportion of the commercial area in the northern part of the Site.



- **Scenario 3** - based around securing multiple companies that require large plots of up to c32 Ha in size.



3

- 3.5.42 This scenario testing has focussed on market enquiries from several potential end-users. As set out above, this has ranged from one very large AM facility that occupies the whole Site, to several separate plots accommodating different end-users.
- 3.5.43 All scenarios were driven by a response to context, for example positioning the smaller and lower buildings to the southern edge where there is greater proximity to the community and locating larger AM facilities in the central and northern part of the site. All scenarios sought to work with and positively integrate the site landscape and achieve connectivity with adjacent communities.
- 3.5.44 A major inquiry for a large-scale AM plant was received in March 2021, which highlighted the sorts of use that the Site might need to accommodate and provided further detailed market intelligence on likely occupier requirements. Subsequently a capacity study was prepared to show how this potential occupier could be accommodated on the Site. This 'real world' enquiry highlighted the scale of what LDO and scheme parameters assessed under the EIA needed to be capable of accommodating.
- 3.5.45 It was concluded, following further work on the implications of meeting this potential occupier's requirements, that preparation of the LDO would proceed on the basis of a single development scenario with parameters developed to accommodate a large AM facility reflecting market demands and requirements in the context of the UK transition to a clean growth future (Scenario 1). Other smaller scale scenarios (broadly represented by Scenarios 2 and 3) would be possible within the development envelope established by the parameters for this scale of use.
- 3.5.46 The decision to progress with a large flexible plot meant that some site features such as the Local Wildlife Sites (LWS) towards the centre of the Site and to the northern and eastern edge would preclude occupiers that were commensurate with the Gravity ambition and market demand, for example a large battery or EV plant. In addition, it was concluded that a drainage

solution was required that would allow for a large, unencumbered AM facility, so parameters were developed to allow through-drainage to circumnavigate the main plot. **Biodiversity is assessed in Chapter 12 and Water Environment in Chapter 13.**

- 3.5.47 Within the southern part of the Site (hatched green on the Land Uses Parameter Plan in **Appendix 3.1a**), commercial land uses will come forward through market demand, within the parameters set out on the Parameter Plans. This part of the Site is an interconnected series of plots with a mix of commercial, education, energy generation, amenity and accommodation space, creating a hub of activity to maximise opportunities for interaction, collaboration and learning. Commercial land use within this part of the Site will be designed to be in keeping with the scale, form and use of surrounding proposed buildings and uses.
- 3.5.48 During the development of these plans, energy infrastructure was added (see below under 'energy infrastructure').
- 3.5.49 The indicative employment mix which has been used to test the Proposed Development in this ES has been informed by commercial advice on the current market; enquiries by potential occupiers (as seen on the plans above) and the aspirations of the LDO.
- 3.5.50 It is considered that, overall, land take will be similar across the three scenarios resulting in comparable environmental effects with regards to land take. However, Scenario 1 could lead to the greatest landscape and visual effects given that the very large AM facility would be very large both in height and massing. Scenario 1 would also require the greatest modification to the existing drainage layout, however, does not result in significant environmental effects.
- 3.5.51 All three scenarios allow for the retention of existing trees and greenspace on the Site boundaries, as well as enhancement of these areas. The ability of the landscaping to mitigate significant landscape and visual effects of the proposed buildings would vary depending on the scale of buildings.
- 3.5.52 The generation of 7,500 jobs will bring many people to the Site. This is mitigated by the potential for onsite accommodation to be provided, however this will still result in an increased trip generation compared with the extant consent. This is expected to be comparable across the 3 scenarios.

Education and Training

- 3.5.53 Education and training provision will be introduced on Site to respond to demand and will be linked to the employment uses of the Site. For example, campus training facilities and centres will be constructed and used to deliver the skills required to upskill the local workforce for careers in AM, in collaboration with local higher education providers.
- 3.5.54 Notwithstanding the flexibility sought through the LDO, no significant alternatives to this land use have been considered through the design development.

Residential

- 3.5.55 The 2017 Planning Consent and early design iterations for the Proposed Development did not include a residential element. However, the Proposed Development now includes the provision of up to 750 dwellings to serve (and thus be tied to) Gravity and these will not take on the characteristics of typical open market housing. The residential element is proposed to be provided within the purple hatched area shown on the Land Uses Parameter Plan in **Appendix 3.1a**.
- 3.5.56 The provision of up to 1,300 dwellings was considered in the early design stages. The rationale for the introduction of dwellings to the Proposed Development and the reasons why the numbers have been reduced to 750 during the design process and the location within the Site of the residential element are as follows:

- On-site accommodation is considered necessary to be able to attract the most forward-thinking companies to the Site. The intention is to provide a step change in terms of the level of housing quality in the surrounding area, as well as introducing a wide range of housing typologies that are specifically tailored towards the Site's requirements. Accommodation will be seamlessly integrated into the Smart Campus and a critical mass of people residing on-site will ensure a level of vibrancy that will help to sustain social infrastructure.
 - Accommodation on site will support the key principle of retaining employees within Sedgemoor, allowing them to live sustainably, living and working in close proximity to one another which will, in turn, reduce trips on the highway network.
 - The number of dwellings has been refined during the design development as the housing mix has been better refined and broadened to include lower density executive homes and smaller units to support employees in the early stages of their career. The total anticipated area for accommodation has also reduced to allow for a greater proportion of leisure and community at the south of the Site.
 - Dwellings are located in the southern part of the Site to ensure residents are located within the area with most activity, near to the mobility route to ensure the dwellings are within an easy commute to the places of work, as well as being near to amenity and facilities such as shops, restaurants and leisure uses on and off site.
 - The location of dwellings in the southern part of the Site was also considered most appropriate as it is in proximity to existing residential properties in the adjacent villages, albeit retaining a buffer to avoid coalescence. This has the added effect of embedding a lower density scale as a buffer between the existing residents of the adjacent villages and the commercial and manufacturing premises proposed further to the north.
- 3.5.57 Homes will be purpose designed to meet the needs of the workforce and will embrace Modern Methods of Construction (MMC) and drive a new standard for placemaking.
- 3.5.58 This residential element is assessed within this ES. Additional traffic arising as a result of residential land use is assessed within the Transport Assessment and appropriate mitigation has been identified, including mobility hubs. Given that the residential element is being designed and provided to target workers at Gravity and will be brought forward on the basis of occupier requirements, it is anticipated that the majority of trips will be within the Site. Had the assessed housing been typical open market housing, this would have introduced a greater number of trips, with its associated noise and air quality impacts.
- 3.5.59 Therefore, there will be a lesser environmental effect of 750 dwellings as compared to 1,300 dwellings, through a reduced number of trips and through co-habitation of employees with non-site employees and their families. The decision to provide dwellings of a character and typology targeted to serve Gravity and the needs of its occupiers, rather than typical open market housing, will further reduce trip generation. In addition, 750 dwellings as compared to 1,300 will result in a reduced demand on local services.

Community and local centres

- 3.5.60 The core purpose of the Smart Campus is to provide large scale AM. Given the rail access to the north and the large-scale nature of the buildings located to the north of the Site, and the likely need for security for the commercial land uses, the community land uses were located on the southern part of the Site from the outset.
- 3.5.61 Community uses have been deliberately located close to existing villages to ensure inclusivity. These facilities also provide a positive 'front door' appeal to the Proposed Development and the sensitive nature of the south of the Site lends itself to these less industrial land uses.

Community uses will be designed to sit alongside leisure uses in the south of the Site to start to build up a compelling offer for visitors and residents.

- 3.5.62 Community provision was not considered suitable further north into the Site as it would diminish flexibility for AM and would feel peripheral in relation to the existing villages.
- 3.5.63 Location of the community uses in the south of the Site also enables them to be integrated fully with the passenger station, the residential areas, the Village Enhancement Scheme route (connecting the two villages through the Site) and other sport, leisure, education and hotel uses that are also proposed in this southern part of the Site. Alternative locations within the Site were not considered for this land use given these facts and local characteristics.
- 3.5.64 If demand requires, a nursery/day care facility and potentially other educational facilities will be provided for use by the occupiers and workforce on Site. For the same reasons as set out above for community uses, these will also be located in the southern part of the Site and other alternative locations within the Site were not considered for this land use.

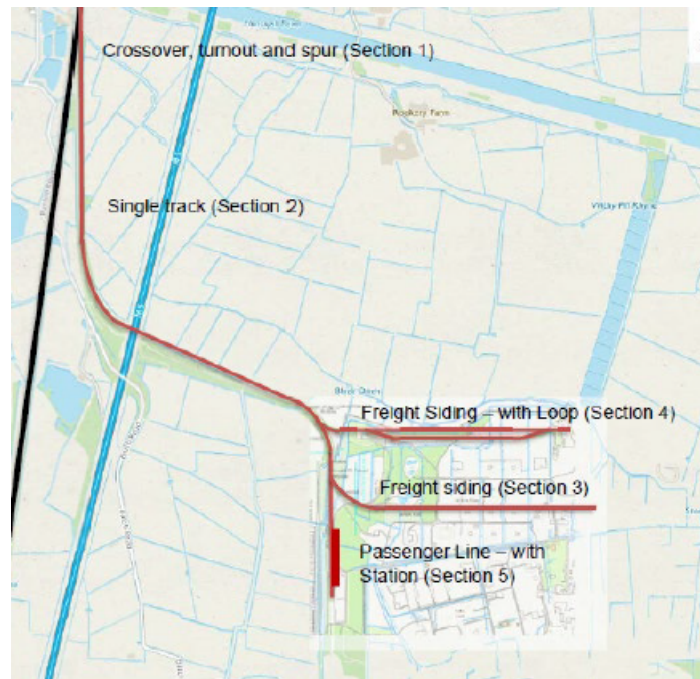
Energy infrastructure

- 3.5.65 The design process has identified an important site for energy infrastructure beneath and adjacent to the 400kV powerlines on the eastern edge of the Site as additional connectivity and a substation is required for the Proposed Development. This was included in response to Western Power Distribution (WPD) advice regarding the size of the substation required to service the Site and a requirement for battery storage.
- 3.5.66 It is located partly under the 400kV pylon corridor which helps to make efficient use of land, as any build development is restricted under powerlines for health and safety. This location has the additional benefit of being in a peripheral location away from the main body of the Site.
- 3.5.67 This location under the powerlines does correspond to Great Crested Newt habitat, however the need for proximity to the powerlines necessitated this location for this vital piece of infrastructure. Therefore, suitable mitigation for Great Crested Newts will be provided (see **Chapter 12 Biodiversity**).
- 3.5.68 For these reasons, other alternative locations within the Site were not considered for this land use.
- 3.5.69 The 2017 Consent included land safeguarded for energy generating uses. There is no longer market interest in delivering these safeguarded areas, nor is this compatible with Gravity's Clean and Inclusive Growth Strategy. The Energy Strategy for Gravity enshrines a definitive move away from fossil fuels and therefore a reduction in emissions that could contribute to climate change and therefore this type of energy generation was not considered to be an appropriate alternative form of development.

Railway line

- 3.5.70 The reintroduction of the railhead is considered important in creating sustainable transport choice and to reduce the reliance on road-based transport into the Site. It was safeguarded within the 2017 Planning Application along the western edge as shown on the Land Uses Parameter Plan (**Appendix 3.1a**), albeit as a combined freight/passenger spur.
- 3.5.71 The Proposed Development comprises a split between the passenger and freight spurs so that the passenger spur retains the western alignment and enjoys close proximity to Puriton and the smart community in the south of the Site. The Proposed Development also includes the potential for an additional spur to connect into the AM zone in the north of the Site. This allows the freight to be repositioned away from the sensitive south of the Site and it increases the marketability of the AM plot.

- 3.5.72 A number of rail alignments within the Site were considered during the design development process in discussion with Network Rail to ensure that corridors were in compliance with NR track standards. These were limited within the Site given the route connecting into the existing network is already defined and the bridge over the M5 is also in place. As such, the rail corridor, as shown on the Land Uses Parameter Plan ([Appendix 3.1a](#)), has been retained to ensure that there is sufficient scale and flexibility to accommodate both occupier and Network Rail requirements. The plan below shows one potential configuration:



Other design aspects

Building Heights

- 3.5.73 Consideration of the distribution of density and building heights has progressed through the design process in collaboration with the project landscape architects and masterplanners.
- 3.5.74 Market facing appraisal and direct potential market enquiries have demonstrated the broad range of building heights that could be required at Gravity. The AM Study found that buildings can be up to 30m high, but that also some industries can require up to 40m clearance. Building heights have also been carefully considered to respond to site levels, proximity to existing settlements and intended uses.
- 3.5.75 A strategy that allowed for the tallest buildings at the front of the Site would have an overbearing impact on the surrounding villages and would increase the risk of perceived coalescence and was therefore discarded. Concerns around coalescence of the Site with the adjacent villages of Puriton and Woolavington has been raised through public consultation.
- 3.5.76 This overall approach to scaling down height from north to south within the Site has also arisen from landscape and visual appraisal work concluding that the northern part of the Site can more readily accommodate greater height, due to greater distance from the nearby communities and the previous land use as the ROF. Lower height towards the south of the Site and in particular fronting onto Woolavington Road is more in keeping with the scale of existing development in the nearby communities and giving a sense of community scale development in the southern part of the Site.

- 3.5.77 The proposed building heights in the south of the Site accord with the principles established in the Puriton Energy Park SPD (2012) of lower building heights close to Puriton and Woolavington. The south of the Site is also generally higher at ground level and is also locally prominent and allowance for taller buildings generally increases as the Site falls to the north.
- 3.5.78 The Building Heights Parameter Plan (**Appendix 3.1d**) therefore provides for buildings of up to 35 metres ridge height in the northern part of the Site, scaling down through a maximum 23 metres ridge height in the more central area and down to 12, 11 and 9 metres progressively to the south of the Site.
- 3.5.79 The maximum 35m ridge height for AM has resulted from market facing appraisal and direct potential end-user enquiries.
- 3.5.80 Within the part of the Site that is proposed to have buildings up to 35m, an additional 10 metres on top of the 35m is proposed for stacks. An additional 3 metres above adjacent building height is proposed for any Energy Generation use across the Site. No alternatives have been considered in relation to stack/flue heights as these are typical height requirements for the land use types shown on the Land Uses Parameter Plan.
- 3.5.81 The height and number of flues associated with Energy Generation will be determined by dispersion modelling (this is typically 3m higher than adjacent building height).
- 3.5.82 Adjacent to the village of Puriton, the Building Heights Parameter Plan shows the ridge height to be up to 11 metres, however, only up to 50% of the zone will accommodate buildings, and the remainder will be associated infrastructure such as green infrastructure, community uses, sports, leisure or associated infrastructure such as roads, footpaths and cycle routes.
- 3.5.83 The distribution of height and massing across the Site is considered to create a legible separation of the zones whilst providing an integral Smart Campus. This distribution has also been developed to reflect the importance of sunlight and daylight into key areas, in particular dwellings and play spaces.
- 3.5.84 Alternatives considered include the provision of taller buildings in some parts of the Site, but it was considered that a maximum should be set (as above) which was considered appropriate to remain in keeping with existing built development on the southern settlement edge of Puriton and Woolavington.

Biodiversity

- 3.5.85 Biodiversity Net Gain has been a principal design driver for the Proposed Development and is a key element in ensuring that Gravity alleviates its impacts on biodiversity and provides social and environmental benefit to existing and future occupiers.
- 3.5.86 The Strategic Landscape Parameter Plan (**Appendix 3.1f**) has been driven by the market facing approach to the LDO whilst seeking to integrate site assets and achieve strong placemaking.
- 3.5.87 The approach taken is pragmatic and has focused on retaining, where possible, the key features of the Site's landscape character including waterbodies, trees and rhynes. Habitat creation and enhancement, including structural tree and woodland planting are among a number of design considerations that are embedded in the Design Guide.
- 3.5.88 A 'Green Edge' will be provided along Woolavington Road to reflect a campus feel and placemaking nodes (Central Park, Gravity Green and Gravity Plaza) will be incorporated within the area shown green hatched on the Land Uses Parameter Plan and landscaped as appropriate. Within the area shown blue hatched on the Land Uses Parameter Plan, 50% will be blue and green infrastructure, community uses, sports, leisure and associated infrastructure.

- 3.5.89 Within the rail corridor, trees will be retained where possible, subject to the rail alignment and other necessary associated infrastructure. The existing landscape bund along the western Site boundary will be retained, with existing trees also retained where possible, and with structural tree and woodland planting incorporated to the west of the bund. No alternatives as such have been identified for the biodiversity elements of the Proposed Development, which has followed the principles of habitat retention where possible whilst delivering a market-led scheme.

Drainage

- 3.5.90 A number of drainage solutions were considered throughout the design development process. These solutions were largely dictated by the size of the AM facility.
- 3.5.91 Consideration was made of the retention of the long north-south ditch that would provide a direct conveyance route through the Site. However, this conflicted with the need to retain flexibility for a large northern plot.
- 3.5.92 In addition, options to culvert underneath the large northern plot were considered, however this option was considered to pose a high level of constraint on potential development and also a potential for challenges to ongoing maintenance of any culverts under such large buildings, see **Appendix 13.2: Surface Water Drainage Strategy**.

Access and Movement

- 3.5.93 The approach to access and movement for the Proposed Development has evolved with the design of the proposals and has also been influenced by the wider delivery and strategy proposals relating to the Gravity Link Road.
- 3.5.94 Access and movement is shown on two Parameter Plans: Transport: Micromobility and Transport: Strategic Infrastructure.
- 3.5.95 The access and movement framework is essential to supporting the overall Smart Campus approach and to support the Clean and Inclusive Growth Strategy, in particular to de-carbonise transport, minimise transport impacts on the strategic and local road network, establish multi-modal transport infrastructure including the rail restoration, encouraging micromobility blending community and campus movement and providing corridor infrastructure to enable autonomous movement.
- 3.5.96 Construction of the Gravity Link Road and the green bridge connecting Puriton to the south is due to be completed in October 2021. In addition, the Village Enhancement Scheme is now consented and will be completed in 2022. The Transport Parameter Plans have evolved to build upon transport and access opportunities from these developments.
- 3.5.97 The primary access (all transport modes) to the Site for vehicles will be from the Gravity Link Road in the south-west corner. Secondary access (all transport modes) will be provided from Woolavington Road along the southern boundary of the Site.
- 3.5.98 Restoration of the railway line for freight and passenger use will provide access by rail from the north-west of the Site. As stated above, no alternatives to this access were considered as this is the route of the previous rail line. A corridor for the rail route is provided on the Parameter Plans to enable the exact routing within the Site to be developed to respond to market demand. The Transport: Strategic Infrastructure Parameter Plan shows that the southern part on the railway line in the Site terminates in a passenger station which will be accessible to local residents, including residents of Puriton and Woolavington.
- 3.5.99 Further access will be available from the B131 Causeway to the east for emergency/operations/pedestrian/cycle only. No alternative to this route was considered as this utilises an existing access route that will be improved as required.

- 3.5.100 Various options have been considered for the internal transport, road and micromobility connections. As indicated on the Parameters Plans, these locations are not fixed and will be located to respond to end-user requirements, insofar as those requirements are in keeping with Gravity's objective of clean and inclusive growth.
- 3.5.101 Crossing points will be provided at various locations on all major routes on desire lines to ensure that pedestrians and cycles are able to easily cross these routes and create a permeable network of active travel routes, but again are shown as 'indicative' on Parameter Plans.
- 3.5.102 In conclusion, the Proposed Development maximises transport and access opportunities, including opportunities for active travel, from the approved route of the Link Road. Final locations and design of all transport and movement features will be determined through market demand and end-user requirements and designed and implemented in accordance with requirements as set out in the Design Guide.

Conclusion

- 3.5.103 The Parameter Plans for the Proposed Development have been based on the requirements of national and local policy and the design brief set by Gravity. Its objective is to meet the market demand whilst taking into account environmental conditions, public consultation, viability considerations and by responding to the constraints and opportunities of the Site.

3.6 Post LDO Adoption

- 3.6.1 Once the LDO is adopted, development within the Site will proceed in accordance with the LDO documents: the Local Development Order itself and the accompanying Design Guide.
- 3.6.2 An Application for Compliance Form will be completed by a prospective applicant and submitted to the local planning authority and a Certificate of Compliance will be issued by the local planning authority if the application is determined to be compliant with the parameters of the LDO. Otherwise the local planning authority will provide written advice on how to proceed.
- 3.6.3 A requirement of the LDO is that Gravity will submit a Position Statement to SDC on each anniversary of the date of the LDO. The Position Statement will provide details of extant development consented under the Order at the date of its submission and shall include details such as a list of Certificates of Compliance granted during the previous 12 months; details on the number of market and affordable housing dwellings, and non-residential uses completed and under construction, detail on S106 contributions and an updated plan showing the above.
- 3.6.4 The LDO will require formal reporting to enable a plan, monitor and manage approach to the enterprise zone board, and monitor effects and direct mitigation through dedicated management teams on transport, as well as environmental and social value creation. Mitigation planning and the delivery of mitigation via partners and statutory bodies will be informed by the investment plan and secured via the funding agreement.
- 3.6.5 The LDO will require occupiers to develop their own Environmental and Social Governance (ESG) policies and prepare an annual ESG report on progress.
- 3.6.6 In order that the regeneration benefits of the LDO are secured, SDC as the local planning authority will review progress with the LDO on the 5th anniversary of its adoption to be able to fully reflect on the continued suitability of the LDO in the light of any changes to planning policy. This review is secured by way of a condition attached to the LDO.

4 Demolition Construction and Site Management

4.1 Introduction

- 4.1.1 This chapter provides information on the demolition and construction of the Proposed Development and the management of the construction phases on Site.

4.2 Demolition and Construction Works and Programme

- 4.2.1 Construction of the Proposed Development will be market-led and will therefore respond to occupier requirements (within the parameters of the LDO and/or extant planning permissions). There is the potential that the commercial element of the Site is taken forward by one occupier developing an advanced manufacturing facility. Alternatively, the commercial element could be brought forward by several occupiers.
- 4.2.2 It is anticipated that the construction of the Proposed Development will be completed on a phased basis, with elements being occupied whilst other phases are being constructed.
- 4.2.3 The phased nature of the construction of the Proposed Development means that environmental effects during demolition and construction will vary temporally and geographically through the construction period.
- 4.2.4 The completion of the Gravity Link Road will greatly assist the provision of a dedicated access to service construction.
- 4.2.5 The construction programme is not available at this time. It is anticipated that construction will commence in 2022 and be complete by 2032. Therefore, while construction is anticipated to last for up to around 10 years, it is not anticipated that any area of the Site or surrounding area will experience construction effects during all, or even the majority, of that time. Construction effects also typically vary in magnitude depending on the processes occurring at any one time (e.g. earth movements are more likely to lead to significant environmental effects than internal fit out of a building).
- 4.2.6 The EIA has been mindful of how the phased delivery of the development may lead to significant environmental effects (e.g. occupiers of earlier phases being affected by construction of later phases) and this is documented in the technical assessment chapters. However, due to the type of effects and their temporary nature, specific scenario testing of phases within the EIA has not been included. It is considered that the ES provides a conservative assessment of the likely significant effects of the Proposed Development during demolition and construction.
- 4.2.7 The majority of demolition of the former ROF Site has been undertaken through the Site demolition and remediation works that were completed in November 2020 under the Remediation Planning Consent. However, there are a limited number of buildings remaining that will require to be demolished to accommodate the LDO. These are shown on the Existing Buildings to be Demolished Parameter Plan in **Appendix 3.1g**.
- 4.2.8 Embedded mitigation through the landscape management plan will be delivered early in the construction period to provide structural landscaping in the short term which will embed and develop to provide an exceptional setting for occupiers as well as provide advanced mitigation to reduce visual impact effects in later years.
- ### **4.3 Construction Management**
- 4.3.1 All of the demolition and construction operations carry with them a range of issues to be dealt with in their design, preparation and execution.

- 4.3.2 Best practice in construction management is already being implemented and will continue to be so to minimise the potential environmental effects and disruption that could be caused by the construction works. This has and will continue to minimise potential disruption to affected communities, services and habitats.
- 4.3.3 Key demolition and construction activities are likely to include:
- Establishment of construction compound(s) and welfare facilities;
 - Temporary workforce accommodation for contractors for up to 200 workers;
 - Demolition of the remaining buildings;
 - Vegetation clearance, earthworks and soil preparation to prepare the Site for construction activities;
 - Construction of infrastructure including internal access routes, highway improvements, railhead reinstatement, access works and drainage;
 - Formation of open space, with associated landscaping;
 - Construction of building foundation, structure, cladding and glazing and internal walls and partitions;
 - Installation of fixtures, fitting and building service;
 - Utility diversions, upgrades and connections; and
 - Soft landscaping.
- 4.3.4 The construction works will be confined to the Site, apart from those that will be undertaken within the boundaries of the highway where the new accesses will be provided.
- 4.3.5 Construction compounds within the Site will be sited giving consideration to the environmental and visual effects of development as well as a practical solution to allow the development to proceed.
- 4.3.6 The sound environmental management of the demolition and construction works will be delivered through principles set out in the Framework Demolition and Construction Environmental Management Plan (DCEMP). The Framework DCEMP is provided at **Appendix 4.1**. The Framework DCEMP will be taken forward for each phase by the Principal Contractor for that phase.

4.4 Construction Traffic

- 4.4.1 Traffic will be generated during construction of the Proposed Development as a result of bringing plant and materials to the Site and due to construction personnel accessing the Site. This will utilise the completed Gravity Link Road.
- 4.4.2 **Chapter 9 Transport and Access** sets out additional details on construction traffic and management.
- 4.4.3 Management of construction traffic, deliveries and personnel access will be managed through principles set out in the Framework DCEMP.
- 4.4.4 Routes for construction traffic involved in the delivery / removal of equipment and materials to and from the Site are set out in the DCEMP.

- 4.4.5 Movements of large or abnormal loads will be agreed in advance with SDC, other relevant highway authorities and the Police in order to ensure compliance with regulations and advance notification for neighbours.

4.5 Construction Waste

- 4.5.1 Schedule 4 of the EIA Regulations states that this ES should include a description of the development, including *“an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases”*.
- 4.5.2 The demolition and construction works will be undertaken in accordance with legal requirements, and it is proposed that waste will be minimised by moving waste up the waste hierarchy, avoiding waste during construction, diverting as much waste as possible from final disposal to more sustainable waste management options.
- 4.5.1 A Framework Site Waste Management Plan (SWMP) has been prepared for the demolition and construction phase to support the LDO and is provided at **Appendix 3.3**. The SWMP will help resource efficiency principles to be incorporated, where consideration is given to designing out waste, reducing waste generated on-site as well as reuse, recycling, and recovery of waste. Estimated waste arisings from the construction of buildings has been calculated using established national SmartWaste benchmarks based on the Building Research Establishment’s (BRE) Smart Waste Benchmark Data (BRE, 2017).
- 4.5.2 Detailed assessments of waste arisings for the construction stage will be undertaken within a separate detailed SWMP, when more details are known on the construction process for each phase prior to works commencing on site.

5 Assessment Methods

5.1 Introduction

- 5.1.1 This Chapter describes the process by which the EIA has been carried out. It includes a discussion of the relevant regulations, the EIA process, consultations and the over-arching assessment methods applied. Details of the technical method followed for each topic are presented in each of the **Chapters 7-16** as appropriate.

5.2 EIA Regulations

- 5.2.1 The EIA for the proposed LDO is governed by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) ("the EIA Regulations"). The EIA Regulations transpose the provisions of European Council and Parliament Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU ("the EIA Directive"). To ensure that the provisions of the EIA Regulations would continue to be implemented in the same way or an equivalent way following the exit of the United Kingdom from the EU at the end of the transition period, appropriate amendments were made by The Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018. There has been no substantive change to EIA requirements as a result of the departure of the UK from the European Union.
- 5.2.2 Regulation 32 of the EIA Regulations provides for amendments to be made to the EIA process so as to ensure that the requirements of the EIA Directive are met where a local planning authority proposes to grant planning permission by local development order.
- 5.2.3 Environmental information comprises the ES, including any further or other information, any representations made by the bodies required to be notified by the EIA Regulations and any other representations duly made by any other person about the environmental effects of the Proposed Development.
- 5.2.4 Regulation 18 and Schedule 4 of the EIA Regulations detail the required information for inclusion in an ES. For ease of reference Regulation 18 and Schedule 4 are presented in **Appendix 5.1**.

5.3 The EIA Process

- 5.3.1 In general terms the main stages in the EIA are as follows:
- Screening – determining the need for EIA;
 - Scoping – identify significant issues, determining the scope of the EIA;
 - Establishing Baseline – drawing together and reviewing existing available data and undertaking surveys to determine the existing and future baseline conditions;
 - Assessment and iteration – assess likely significant effects of development, both adverse and beneficial, evaluate alternatives, provide feedback to the design team on potential adverse impacts, modify development or impose parameters, incorporate mitigation (including potential monitoring and long-term management), assess effects of mitigated development;
 - Preparation of the ES; and

- Consultation on the ES.

5.3.2 Review of environmental information – The steps required to be taken by SDC in examining the environmental information, reaching a reasoned conclusion on likely significant effects, integrating that conclusion into the decision on adoption of the LDO, including whether it is appropriate to impose monitoring measures. Environmental information comprises the ES, including any further or other information, any representations made by the bodies required to be notified by the EIA Regulations and any other representations duly made by any other person about the environmental effects of the Proposed Development.

5.4 Screening

5.4.1 Regulation 32 (2) requires that a local planning authority must not make a local development order unless it has prepared information as per Regulation 6 (2) in accordance with Regulation (4).

5.4.2 A Screening Opinion outlining the description of development and likely significant effects of the development was adopted by SDC on 23rd June 2021 (application no 99/21/00127) identifying that an EIA is required for the LDO.

5.5 Scoping

5.5.1 An EIA Scoping Report was prepared to document the proposed scope and approach to the EIA, in line with Regulation 15 of the EIA Regulations (reference 42/21/00021). This is provided in **Appendix 5.2**. Statutory consultation with relevant statutory and non-statutory bodies was undertaken from 29th June 2021 to 3rd August 2021 on the Scoping Report to inform assessments being undertaken for this ES.

5.5.2 An EIA Scoping Opinion was issued by SDC on 27th September, planning reference 42/21/00021. This is provided at **Appendix 5.3**.

5.5.3 **Section 4** of each of the technical chapters (**Chapter 7-16**) provides information on the consultation undertaken that is relevant to that topic and has considered the information provided in the Scoping Opinion. As a result, this ES has been prepared to fulfil the requirements of the adopted Scoping Opinion.

5.6 Consultation

5.6.1 In addition to consultation to agree the scope of the EIA, consultation with relevant statutory and non-statutory bodies has been undertaken throughout the EIA and design process (provided in **Section 4** of each of the technical chapters, **Chapter 7-16**).

5.6.2 As part of the EIA process, consultees have been consulted to agree the detailed scope of the assessment, to provide information, to discuss assessment methods and findings, and/or agree mitigation measures and design responses.

5.6.3 A Gravity LDO Delivery Group was established in October 2020 to drive forward the LDO and facilitate ongoing collaboration. The Delivery Group has continued throughout the EIA process on a monthly basis and includes key statutory consultees; SDC, SCC, Highways England, Environment Agency, Natural England, and Network Rail. The proposed approach to the EIA has been discussed and agreed with the Delivery Group.

5.6.4 There are also several sub-groups to the Delivery Group, including the Transport, Utilities and Environmental Sub-Groups, which have facilitated further consultation where required.

5.6.5 The approach by Gravity has been to have open dialogue throughout the process with the community and business with an on-site direct point of contact and regular parish council

liaison including engagement in the Villages Together project. Comprehensive public consultation has also been carried out in advance of the LDO and ES being submitted for formal consultation (see the Gravity Local Development Order document for more information) as well as wider engagement with key stakeholders and the business sector across the South West. Regular dialogue with the Department of International Trade has enabled the team to refine the Proposed Development to align with market demands.

- 5.6.6 The feedback from all aspects of the consultation set out above was analysed and a number of key themes emerged, namely: Quality of Employment Opportunities for Local People; Gravity Vision for Clean Growth; Sustainable Smart Mobility & Connectivity; Protection of Homes for Local People; Community Facilities; An Enhanced Natural Environment and Local Road Safety. Information on responses to these themes is provided in Section 3.4 of the Gravity Local Development Order document.
- 5.6.7 Statutory and public consultation will also be carried out on the LDO documents, including this Environmental Statement, during the LDO consultation period in Autumn 2021.

5.7 Assessment Scenarios

Introduction

- 5.7.1 An LDO tends to be made prior to the commencement of any development on a site, however in this case, there has already been some development that has been implemented within the Site, such as the site remediation and the Gravity Link Road. To ensure that the EIA is clear, consistent and transparent, the following approach to the assessment of the Proposed Development has been followed.

Environmental Baseline

- 5.7.2 As a general principle, environmental effects are assessed by comparing the predicted state of the environment without the Proposed Development, with the state of the environment with the Proposed Development for a particular year. This necessitates predicting how current conditions at the Site may change without the LDO being made and implemented.
- 5.7.3 The year 2032 has been identified as the assessment year for operational effects for the majority of the technical assessments included in the ES. This year has been identified as it is the end of the current Local Plan period and a date by which it is reasonable to assume that the development approved by the LDO will have been delivered.
- 5.7.4 The climate change assessment considers the assessment year (2032) as well as 25-year intervals up to 2099, as this is the final year available in the UKCP18 climate projections dataset.
- 5.7.5 As required by the EIA Regulations, the ES describes the relevant aspects of the current state of the environment at the Site and in the surrounding area.
- 5.7.6 The current conditions at the Site and in the surrounding area have been factored forward to predict likely conditions at the Site in 2032 to enable the effects of the LDO to be considered against a 'do nothing' scenario.
- 5.7.7 The following elements are therefore included in the 2032 Baseline:
- The implemented 2017 Planning Consent. This is based on the note setting out the Parameters established by the 2017 Planning Consent and Environmental Statement provided at **Appendix 2.2**. The safeguarded land uses are not included in the 2032 baseline as they have not been granted consent (i.e., they were safeguarded only and would require a new planning permission or consent to progress).

- The approved village enhancement scheme was identified as mitigation for the 2017 Planning Consent and will be implemented one year from the opening of the Gravity Link Road, i.e., by autumn 2022. Therefore, this is factored into the 2032 baseline.
- Landscaping associated with the Gravity Link Road, which is due to be implemented from October 2021.
- Other existing and approved development in the surrounding area. This includes development that has been allocated in the Local Plan 2011-2032. These developments, either allocated, approved or considered likely to have been approved and implemented by 2032 are shown in the table in **Appendix 1.3** and on the plan at **Appendix 1.4**. Schemes that have been scoped out of the 2032 baseline, and the rationale for so doing, have also been included in the table in **Appendix 1.3**. The review undertaken to identify these developments included all development within 3km of the Site and developments subject to EIA within 5km of the Site as significant cumulative effects are unlikely beyond these zones. Note that no EIA developments within 5km are proposed to be scoped in, therefore the plan at **Appendix 1.4** shows the 3km buffer only.
- Likely changes to the natural environment between now and 2032. This includes natural changes such as growth in vegetation and establishment of habitats, especially of landscaping implemented as part of the 2017 Planning Consent. It also includes anthropogenic changes such as changes to climate, air quality and human behaviours where there can be a high degree of confidence that such changes will occur (for example the transition towards electric vehicles on the basis of clear Government policy on the phasing out of internal combustion engines and the increase in bus services to avoid private vehicle usage as promoted in the recently published national bus strategy). Each chapter outlines as appropriate how these changes have been considered in establishing the 2032 baseline.

5.7.8 The approach set out above is consistent with the EU's *Guidance on the preparation of the Environmental Impact Assessment Report* (2017), which states:

"The state of the environment and the nature of impacts such as pollution rates or emission limits change over time, and this has to be accounted for in the Baseline assessment. In addition, the Baseline should consider Projects in the vicinity that exist and/or that have been approved (see Part B section 1.4.3 on Cumulative Effects). The Baseline should, therefore, be dynamic, going beyond a static assessment of the current situation. This is especially important for issues where there is considerable uncertainty, such as climate change, or for longer-term developments, such as large infrastructure Projects."

5.7.9 A range of Site surveys and data collection exercises have been used to establish environmental conditions at the Site and in the surrounding area to provide a basis for the subsequent assessment work. The surveys undertaken are reported in each of the technical chapters. These also build upon the work undertaken for previous planning applications at the Site.

5.7.10 It should be noted that some of the technical surveys and assessments on which the EIA is based are too detailed and lengthy for incorporation into Volume 1 of this ES. In such instances, the technical survey and assessment reports are provided in full as an appendix to this ES (Volume 2), with a relevant summary and the reference for the full survey or assessment provided in the ES. The geographical scope of these appended surveys and assessments has been based on the likelihood for significant effects.

Assessment Assumptions

5.7.11 The following assumptions have been used to ensure that the EIA has assessed the likely significant effects of the Proposed Development. A generic list is provided, followed by a list under the heading of each technical chapter in this ES.

- The Proposed Development will be constructed in accordance with:
 - The details and parameters documented in **Chapter 3**;
 - The works and programme documented in **Chapter 4** and in accordance with a FDCEMP (**Appendix 4.1**); and
 - The Parameter Plans (**Appendix 3.1a-f**).
- An investment plan is in preparation, collaboratively between Gravity, SDC and EZ partners which will inform the implementation process. Linked to a separate funding agreement this will inform phasing of infrastructure and priorities for investment of business rates to enable effective implementation and site mobilisation to ensure delivery as a priority, to maximise the benefits that Enterprise Zone status can deliver for the locality.
- It is anticipated that the construction of the Proposed Development will be completed on a phased basis, however, given the market-led nature of the LDO, no detail on potential phasing is available at this time.
- Temporary accommodation will be required during the demolition and construction phase for up to 200 workers.
- Regarding the potential for stacks, the assumption is an additional 25m is permitted for stacks, above the 35m ridge height (up from 2m above existing ground level) and for flues, the assumption is 3m higher than the adjacent building height, both as shown on the **Building Heights Parameter Plan, Appendix 3.1d**.
- Development under/adjacent to the power lines – the area under the power lines within the 'Energy Distribution and Management Infrastructure' are shown on **Appendix 3.1a: Land Uses Parameter Plan** will only be used for energy infrastructure. i.e. sub-stations and batteries etc. The ES addresses the constraint posed by the power lines and not affecting either the power lines or leading to effects/risks from development in the vicinity of them.
- There is no education provision (primary or secondary) within the Site, and provision will be made within existing schools as required. There are nursery and health centre uses for site occupiers and the workforce.
- A campus training facility will be provided on Site to provide training, learning and development facilities for the occupiers and to train their workforce with the skills required for their operations.
- As noted in **Section 3.2, Description of the Proposed Development**, the development will provide 1,000,000 sqm commercial building or buildings. For the purposes of the EIA, it has been assumed that this will be delivered as the following mix of use classes:
 - 1,000,000 sqm advanced manufacturing uses
- As also noted in **Section 3.2**, 100,000 sqm within use classes C1, C2, E (a) – (g), F and B8 will be delivered. For the purposes of the EIA, it has been assumed that this will be delivered as the following mix of use classes:
- 35,000 sqm E(g) [formerly B1b] uses (assumed R&D)
- 15,000 B8 (AdvMan complementary goods in / despatch space))

- 7,500 sqm E(g) [formerly B1c] uses (assumed industrial processes)
- 7,500 sqm E(g) [formerly B1a] uses (assumed incubator space)
- 35,000 sqm of other supporting land uses
- The inclusion of B8 use within the 100,000 sqm identified in part b) (ii) of the Description of Proposed Development (**Section 3.2**) has been made to provide flexibility to accommodate potential uses that are complementary to Advanced Manufacturing occupiers, such as data centres, in other suitable and appropriate locations across the Site. The B8 uses proposed are not the 'traditional distribution type' use, but rather those directly related to the operation and supply chain of Advanced Manufacturing or the potential arrival and despatch of materials and products of Advanced Manufacturing processes.
- Residential – up to 750 homes to meet the needs of the campus and related workforce.

Economics Assumptions

COVID-19

The additionality assumptions presented have been adjusted to take account of the increased competition for contracts which may arise as an implication of the COVID-19 pandemic on the labour market.

Labour Market Study Area

- 5.7.12 The Labour Market Study Area is consistent with the combined borders of Sedgemoor and the former Taunton Deane Council. This geography was identified as the M5 Corridor Functional Economic Market Area (FEMA) within the Housing Market Areas and Functional Economic Market Areas in Somerset report (2015).
- 5.7.13 It is acknowledged that the report is several years old and that there are many linkages between local and regional economies in the South West, however the M5 Corridor FEMA nonetheless provides robustly defined boundary which will aid the collection and analysis of statistical data.

Capital Expenditure

- 5.7.14 The capital expenditure to deliver the floorspace quantum set out in the Description of Development has been estimated using RICS Build Cost Information Service (BCIS).
- 5.7.15 BCIS data has been rebased to Q3 2021 values for Sedgemoor. The mean build cost per square meter for mixed commercial developments (£3081) and advanced factories/offices – mixed facilities (£1499) have been used as they best fit with the parameters of development described for the Site. In addition, 750 homes are to be delivered on site for use by employees of the Proposed Development. The England average home size of 67.7 sqm has been used, along with the mean build cost per square metre in Sedgemoor (£1,281), to estimate the capital expenditure required to deliver the housing units.
- 5.7.16 Consequently, the estimated capital expenditure to deliver the floorspace quanta is:
- 100,000 sqm commercial x BCIS cost per square meter for mixed commercial developments (£3081) = £308,100,000
 - 1,000,000 sqm advanced manufacturing x BCIS cost per square meter for advanced factories/offices – mixed facilities (£1499) = £1,499,000,000

- 750 homes x average home size of 67.7 sqm x BCIS cost per square metre for housing = £65,043,000.
- 5.7.17 Therefore, the total estimated capital cost of the Proposed Development is £308,100,000 + £1,499,000,000 + £65,043,000 = £1,872,142,000.
- 5.7.18 No discount for scale of development has been applied to the cost estimates, as the floorspace quanta may come forward in a mix of unit sizes and specifications depending on what the market delivers.
- 5.7.19 The robustness of the calculations estimating the capital expenditure are limited by the level of specificity regarding the Proposed Development. It is understood that the Proposed Development will be market-led, and therefore the parameters set out in the Description of Development provide the basis for estimating total build cost. Options for modular and more efficient construction methods are being considered by potential occupiers and therefore costs and in turn labour required for construction may be reduced. Costs and construction methods will be refined at such a time when there is more clarity on the preferred occupier, design and specification.

Worker productivity and Gross Value Added

- 5.7.20 Figures for Gross Value Added per head have been sourced from the Office for National Statistics Annual Business Survey. The most current available data is from 2017, and therefore these values have been uprated by the ONS GDP Deflator¹ to bring them to 2021 prices.
- 5.7.21 The GVA per head for the various types of employment supported by the demolition / construction and operation phases of the Proposed Development are summarised in **Table 5.1** below.

	GVA per-employee	
	2017	2021
Construction	£60,664	£65,711
Manufacturing	£63,792	£69,099
Professional, scientific & technical	£55,688	£60,320
Services	£42,708	£46,261

Table 5.1 showing GVA per head

Construction Employment

- 5.7.22 The calculation of construction employment is calculated by taking the capital investment required to deliver the infrastructure and assets as set out in the Description of Development and dividing that figure by the amount of turnover within the construction industry required to support a single worker.
- 5.7.23 Data from the Annual Business Survey revealed that the level of turnover required to support one construction worker in the South West region was £151,953 in 2017. This has been adjusted by the ONS GDP Deflator to uprate the figure to 2021 values, resulting in a turnover of £164,595 to support one construction worker.
- 5.7.24 The estimates of construction employment are limited by the robustness of the build cost data. Current market data has been sourced from BCIS to estimate the capital expenditure, however this may be refined in the future when formal cost estimates have been obtained based on detailed designs and specifications for floorspace and the infrastructure for individual plots.

¹ The GDP Deflator value to translate 2017 prices into 2021 prices is 1.083194909

Net Construction Employment

5.7.25 Only a proportion of total construction employment would occur within the Labour Market Study Area due to mobility of labour, competition from externally located construction firms and supply chains. To take account of these factors, the additionality assumptions detailed in **Table 5.2** below have been used to convert the estimated gross construction employment from the Proposed Development.

5.7.26 The additionality factors are set out in **Table 5.2** below.

Additionality factor	Value	Rationale
Deadweight	9%	The 2017 Hybrid Consent for Huntspill Energy Park will be delivered in absence of the Proposed Development coming forward. The Huntspill Energy Park ES estimated a build cost of £148.1 million in 2012, and uprating this to 2021 prices results in an estimated capital expenditure of £174.2 million. This level of expenditure could support an estimated 1,060 PYE construction jobs, which is approximately 9% of the gross employment supported by the Proposed Development. This therefore represents the deadweight.
Leakage	45%	The scale of the Proposed Development means that the construction labour market within the Labour Market Study Area is unlikely to be able to absorb the full requirement of labour, thereby necessitating the acquisition of resources from a wider area
Displacement	60%	The scale of the Proposed Development and the target sectors is likely to demand a diverse range of skills and capabilities. This is anticipated to result in opportunities which pay higher wages, thereby displacing existing construction workforce participants as they seek to maximise the returns on their labour
Multiplier	2.45	ONS National multiplier for construction
Adjusted Multiplier	1.72	The national multiplier has been adjusted by 75% to translate the impacts to a regional level, and then that figure is then adjusted by 50% to estimate the impacts specific to the Labour Market Study Area. This is done through the formula: $\left[\left[\text{National multiplier (2.45)} - 1 \right] * 0.75 \right] * 0.5 + 1 = \text{adjusted multiplier}$
Total additionality	34.4%	The total additionality is the factor by which gross jobs are adjusted to estimate the level of net additional jobs resulting from the Proposed Development. The total additionality figure is calculated through the following formula: $(1 - \text{deadweight}) * (1 - \text{displacement}) * (1 - \text{leakage}) * \text{adjusted multiplier} = \text{total additionality}$

Table 5.2 Construction Additionality

Operational Employment

5.7.27 The calculation of operational employment is done by taking the total floorspace delivered within a given use classification (i.e. B8 – storage and distribution) and dividing the area by an employment density figure sourced from Employment Densities Guide (3rd edition). Where use classifications are not covered within the Employment Densities Guide (3rd edition), such as advanced manufacturing uses, custom figures have been derived using a combination of market research and previous project experience.

5.7.28 A summary of the employment densities used within the assessment is presented in **Table 7.6** below. **Table 7.6** provides a breakdown of the 1,000,000 sqm of advanced manufacturing space and a breakdown of the 100,000 sqm of supporting commercial floorspace.

Use	Floorspace (sqm)	Employment Density	Gross Jobs
Advanced Manufacturing			
Advanced manufacturing	1,000,000	164	6,100
Manufacturing Support Space			
R&D	35,000	60	585
Industrial Processes	7,500	47	160
Storage/Distribution	15,000	80	190
Other supporting uses	7,500	60	125
Total	65,000		1,060
Supporting & Ancillary uses			
Nursery	1,000	6	55
Hotel/conference centre	8,500	3*	65
Sports/leisure centre	8,000	n/a	50**
Gym	7,500		
Retail/café	750	15	50
Health Centre	750	33	25
37 Club***	2,500	n/a	0
Various other	6,000	60	100
Total	35,000		345
Grand Total	1,100,000		7,505

*Hotel employment density is the number of beds per worker

**The Employment Density Guide recommends 40-50 employees per gym. Assumed to be managed/operated as a single facility with the sport/leisure facilities with upper estimate used.

***existing facility with not net increase in employees anticipated

Table 7.6 Operational Employment Density Assumptions

Key business sector: manufacturing

- 5.7.29 The Description of Development states that the maximum parameters for development are one million sqm of manufacturing floorspace. As the Proposed Development is being taken forward through a market-led approach, the specific developments which will come forward on the Site are not yet known. To that end, a series of assumptions have been made regarding the most likely sectors which will occupy the Site, and their proportion of the total floorspace. It is understood that it is priority at local, regional and national levels to support advanced manufacturing. There are already existing advanced manufacturing hubs for the chemicals industry at Grangemouth and at Humberside, so it is unlikely that Gravity would compete with these clusters.
- 5.7.30 Within the South West there is established expertise within aerospace and advanced engineering. Therefore, an assumption has been made that Gravity will be developed to complement and diversify existing strengths, but also reposition the South West for new growth sector opportunities in advanced manufacturing, particularly around low carbon transport and associated supply chains.
- 5.7.31 It is anticipated that 1,000,000 sqm will be dedicated to advanced manufacturing uses. Market research of existing advanced manufacturing facilities, specifically related to vehicle manufacturing, has revealed an average employment density which equates to one job per 149 sqm of floorspace. With the continued progression and integration of automation technology in manufacturing, it is assumed that the Proposed Development will have slightly lower density than existing facilities (10%). This equates to an employment density of one job per 164 square metres.

Key business sector: professional, scientific & technical

- 5.7.32 The Description of Development notes that the maximum parameters for development include up to 100,000 sqm of commercial space. Due to the market-led approach of the Proposed Development, the specific nature of the development which will come forward within this

floorspace is not yet known. It is understood that this floorspace will host supporting and ancillary functions to the manufacturing space.

- 5.7.33 For the purposes of this assessment, it has been assumed that 65,000 sqm of the commercial space will be dedicated to uses supporting the manufacturing elements, hosting a range of professional, scientific and technical employment (see **Table 7.9**). The weighted average of the employment densities across the various uses equates to one job per 61 sqm.

Net Employment

- 5.7.34 To assess the scale of net additional jobs likely to be generated or supported by the Proposed Development, additionality factors based on the characteristics of the Labour Market Study Area were applied to predicted gross employment. Appropriate economic appraisal guidance² and professional judgment based on similar economic impact assessments have been used to estimate values for:

- **Deadweight:** what would happen in the absence of the Proposed Development;
- **Leakage:** the proportion of employment opportunities accessed by people living outside the Study Area;
- **Displacement:** the proportion of Proposed Development benefit accounted for by a reduction in benefit elsewhere;
- **Multipliers:** to estimate further economic activity associated with additional income and supplier purchases.

- 5.7.35 The additionality factors adopted in this assessment are detailed in **Section 7.7 Assessment of Likely Effects** within the Economics Chapter (**Chapter 7**).

Human Health, Social and Wellbeing Assumptions

- 5.7.36 The Proposed Development will provide up to 750 private housing units. It is assumed the majority of residential dwellings will be occupied by employees of the Proposed Development.

Transport and Access Assumptions

- 5.7.37 Traffic growth factors for the weekday AM and PM peak hours have been derived for Sedgemoor using TEMPro. To avoid any double counting of traffic within the assessment, the default planning assumptions were adjusted to remove housing associated with four committed development sites explicitly assessed using respective TA vehicle trip generations. It was also necessary to ensure that the planning assumptions reflected the housing and jobs growth targets / trajectories set out in the SDC Adopted Local Plan. Jobs associated with the 2017 Planning Consent were not included in the Local Plan targets so no adjustment in this regard was required. All growth factors were however adjusted with the National Traffic Model database as is standard practice.
- 5.7.38 An appraisal of the likely trip generation has been undertaken based upon the scale of development proposed and assumed delivery programme, and it is estimated that peak construction activity would be in 2024. The appraisal has been based on a 5 day working week.
- 5.7.39 To represent a worst-case assessment, additional HGV movements associated with constructing the rail improvements have been included whilst the assessment has also not

² HM Treasury's Green Book appraisal guidance

taken into account potential opportunities to reduce HGV movements with subsequent freight transfer from road based HGV to rail movements.

- 5.7.40 It is estimated that the peak construction period could generate approximately 425 HGV two-way movements per day (18-hour period); a comparable estimate to the 2017 Planning Consent is approximately 349 HGV two-way movements per day (18-hour period).
- 5.7.41 These HGV movements are expected to be distributed onto the local road network with 90% of the HGV movements via the M5 junction 23 (70% north / 20% south), 5% onto the A39 and 5% onto the A38 toward Bridgwater.
- 5.7.42 It is also estimated that there would be up to 1,714 two-way trips from construction works generated per day (18-hour period); a comparable estimate to the 2017 Planning Consent is approximately 1,125 two-way movements per day (18-hour period).
- 5.7.43 This has assumed that approximately 85% of these workers would drive to work (single occupancy) with the balance car sharing or using alternative modes of transport. These trips have been distributed onto the local road network consistent with assumptions for operational employees for the HEP trip forecasting.
- 5.7.44 Since the LDO is a market facing, flexible consent in terms of actual land uses implemented, Gravity has been assessed for a most likely outcome 'Core Gravity' scenario which reflects the land uses and operations as below:
- Gravity will provide up to 1,000,000 sqm of Advanced Manufacturing floorspace creating 6,098 jobs, 65,000 sqm of supporting employment uses and 35,000 sqm of supporting ancillary uses, creating another 1,402 jobs combined.
 - The site will operate on a 24/7 basis for 365 days per annum. A three-shift system for the advanced manufacturing will operate between 06:00-14:00, 14:00-22:00 and 22:00-06:00. The supporting ancillary uses are expected to operate around a similar basis to the three-shift advanced manufacturing activity on site.
 - 90% of advanced manufacturing type jobs are assumed to work the three-shift system, with the remaining 10% assumed to work 09:00-17:00 hours.
 - The advanced manufacturing is assumed, based on a first principles assessment which is set out in the TA, to generate circa 445,000 units output per annum, and HGV movements have been estimated on this basis.
 - 750 residential units with an assumed split of 10% 1 bed, 20% 2 bed, 50% 3 bed and 20% 4 bed.
 - Allowances have been made for trip internalisation on the basis that the Smart Campus will encourage cross visitation (supply chain) between land uses and therefore the site will achieve a level of self-containment which in turn will minimise external trip making. These details are set out in the TA.
- 5.7.45 The scenario assumptions around a supporting transport strategy and transport mitigation measures are summarised below:
- a package of incentives to encourage cycling and enhanced infrastructure including the A38 corridor scheme and A39 route to Bridgwater Station.
 - incentives for employees / residents to use public transport / and or cost on the employee for parking on site.

- Enhanced main A38 corridor bus services and bespoke, dedicated, Demand Response Transit (DRT) minibus / e-bus services for employees geared to align with shift patterns, funded by the investment plan and overseen or commissioned by the transport authority or occupier.
- Incentivised car share system.
- Associated trip internalisation factors.
- Comprehensive package of transport planning measures and monitoring (as set out in more detail in the FTP) to achieve the core target modal share of 65% car driver.

5.7.46 For the purposes of the EIA, it has been assumed (as a worst case in terms of traffic impact) that the potential passenger and / or freight rail facility may not be delivered. It is however expected that this facility will be in place and could lead to reductions in staff and freight traffic movements although such reductions are not accounted for in this assessment.

5.7.47 The assessment undertaken assumes that the provision of the Gravity Link Road will lead to some redistribution of local traffic flows in and around the village of Puriton. The redistribution assessment has been based on traffic using the most logical route post opening of the Gravity Link Road scheme.

Noise and Vibration Assumptions

5.7.48 Normal demolition and construction hours are assumed to be Monday to Friday between 08:00 to 18:00 and Saturday 08:00 to 13:00. It is assumed no demolition or construction work will take place on Sundays or Bank Holidays. For any works outside of these times, agreement with the local authority will be required.

5.7.49 It is assumed that outdoor incident noise levels in external areas used for amenity (i.e. gardens/balconies) are only of concern during the daytime hours, as people are unlikely to make frequent use of the outdoor amenity areas during night-time hours.

5.7.50 The details of the types of construction methods and plant likely to be used during the construction phases are yet to be finalised. Therefore, at this stage in the scheme's design, it is not possible to state precisely where plant will operate and for how long during the working day. However reasonable assumptions have been made to inform the assessment of construction noise presented in this assessment.

5.7.51 The assessment assumes that the construction activities are distributed across the Site in accordance with the parameter plans.

5.7.52 The Proposed Development also includes temporary housing for construction personnel. As it is not yet known where these will be located, a worst-case scenario has been assumed. The lowest ambient level presented in **Table 10.17** in **Chapter 10: Noise and Vibration** has been assumed.

5.7.53 At this stage in the design, it is not confirmed if piling activity or other significant vibration generating activities will be required during the construction of the Proposed Development. It has been assumed that piling will be required for the construction of the proposed commercial and industrial uses. It has also been assumed that if piling is required in the vicinity of residential dwellings, auger piling will be used.

5.7.54 All noise generating activities have been assumed to be operational 24 hours per day.

Trains

For the purposes of the noise assessment undertaken and to determine parameters for that assessment, the following assumptions have been made regarding rail provision:

Freight

- A total of 6 trains in and out (12 movements) during the daytime (07:00 – 23:00);
- A total 4 trains in and out (8 movements) during the night-time (23:00 – 07:00);
- Freight Class is Locomotive Diesel Class 60 with 30 tread braked 4 axle tank wagons, with a total length of 750 metres; and
- Freight train speed is 20kph.

Passenger

- A half hourly train for passengers during the daytime, dropping to one at night;
- Train type is Class 166 DMU; and
- Train speed is 100 kph.

Rail Infrastructure

Plant

- 5.7.55 We will assume the following plant and %on-time. On time is defined as the percentage of time during a typical hour that the plant would be emitting noise.

Plant	Height (m)	On time (%)
Gantry Crane – Movement (drive, trolley and Hoist Motors)	18	75
Gantry crane – broadband alarm	3	75
Gantry crane – spreader impact	6	75
Gantry crane – container placement	6	75
Reach stacker	1.5	100
Telehandler	1.5	100

Air Quality Assumptions

- 5.7.56 The year 2032 has been identified as the assessment year for operational effects. Therefore, to take account of uncertainties relating to future year vehicle emissions and background pollutant concentrations to provide a conservative assessment, the assessment has been carried out utilising 2030 emission factors and background concentrations combined with traffic data from 2032 (which includes full development flows). This is considered a conservative assumption of emissions in the future.
- 5.7.57 Emissions from the onsite energy plant and industrial plant have been modelled using the Breeze AERMOD atmospheric dispersion modelling programme. At this stage the exact emission parameters from the onsite plant are not known, details on the modelling methodology, model input parameters and assumptions are summarised in **Appendix 11.4** of **Chapter 11: Air Quality**.

- 5.7.58 The model assumes that emissions from the energy plant are released from the same flue. At this stage the height and location of the flues are not known and therefore the flue has been modelled at heights of 3m, 10m and 25m from the roof height of the building (35m) as set out in the parameter plans.
- 5.7.59 The assessment has been undertaken assuming that there will be no reduction in baseline deposition in the future, as this is not accounted for within the APIS website predictions. Reductions in baseline deposition are likely to occur because of improvements in background pollutant concentrations in the future, partly from reductions in vehicle emissions.
- 5.7.60 The APIS data does not include future year predictions and therefore on a conservative basis, the APIS baseline is assumed constant for the future year assessments.
- 5.7.61 The IAQM guidance states that trackout may occur for distance of up to 500 m from large sites. As the demolition and construction traffic routing is currently unknown, the worst-case assumption has been made that all main roads may potentially be used by HGVs leaving the Site entrance(s).
- 5.7.62 Energy plant assuming a NO_x emission ceiling of 5g/s, industrial plant assuming a NO_x emission ceiling of 10g/s.

Biodiversity Assumptions

- 5.7.63 It is important to note that the Site boundary represents a greater area of land compared to the boundary of the 2017 Planning Consent. As such, the LDO boundary contains areas that fall outside of the 2017 Planning Consent. Where areas fall outside of the 2017 Planning Consent, but within the Site, they are considered to be unchanged from their current state (as described within the 2020 survey work), except where reasonable changes can be predicted. As part of this, it is assumed that current land uses and management (e.g., farming practices such as cattle grazing) would continue.
- 5.7.64 Overshadowing will occur primarily in the northern areas of the Proposed Development where the buildings are tallest. Such effects are likely to be more pronounced on the immediately adjacent road, rail and hardstanding, however on a precautionary basis, it has been assumed that at least some shading of grassland over and above baseline will occur.

Water Environment Assumptions

- 5.7.65 In the absence of observed/recorded gauge data for watercourses on the Site, the hydraulic model used to assess floodplain extents is not calibrated and is therefore based upon a number of assumed parameters. As a result, there is a degree of uncertainty associated with the design flood levels. However, the modelling analysis has been undertaken in accordance with guidelines set out by the EA and using industry-standard methods. In addition, model sensitivity testing has been undertaken to understand the potential impact upon design flood levels caused by variation of model input parameters. On this basis, the flood levels estimated using the model are considered to be sufficiently robust to inform the FRA and preparation of this chapter of the ES.
- 5.7.66 It is assumed that Environmental Designations for the 2032 baseline will remain the same as the current state of the environment.
- 5.7.67 It is assumed that the hydrogeology of the Site for the 2032 baseline will remain as per the same as the current state of the environment and that no DEFRA or EA designations have changed.
- 5.7.68 It is assumed that the Site will not be designated as a Source Protection Zone (SPZ) prior to 2032 based on Site and study area is currently not being designated.

- 5.7.69 Owing to the planning requirement to implement a Surface Water Management Strategy to serve the development and manage rainfall on site, it is assumed that surface water flood risk on site for the 2032 baseline scenario will be very low (<0.1% AEP).
- 5.7.70 Given that the underlying geology and hydrogeology will remain unchanged when compared to the current state of the environment, it is also assumed that the groundwater flood risk in the 2032 baseline will remain the same.
- 5.7.71 It is assumed that for the 2032 baseline condition, flood risk from reservoirs is to remain unchanged from the current state of the environment.
- 5.7.72 It is not possible to predict the status of the Huntspill for the 2032 baseline, however for the purpose of the assessment assuming the Huntspill achieves Good status by 2027 and maintains that to 2032 would form the basis of a conservative approach to assessing impacts. This approach is based on the Proposed Development being designed to support the objective to improve the status of the Huntspill.
- 5.7.73 In the 2032 baseline, the Site will still benefit from the existing surface water abstraction licences from the Huntspill River and King's Sedgemoor Drain. However, the 2017 Planning Consent did not propose utilising these abstractions to supply non-potable water to the Site, therefore for the purpose of the 2032 baseline condition it will be assumed that abstractions from the Huntspill River or King's Sedgemoor Drain no longer take place, despite the licences still being valid.

Landscape and Visual Assumptions

- 5.7.74 The 2017 Planning Consent includes planting proposals with 11 years of growth (planting has been assumed to be completed in winter 2021).
- 5.7.75 The vegetation clearance required in the north west corner of the Site for the rail yards (the extent of which is uncertain at this time but a worst case is assumed of clearance of the whole woodland area within the rail corridor and potential replacement of the rail bridge over the M5) and the introduction of the large scale construction equipment and emerging large scale built form of the Proposed Development which would occupy parts of the skyline in places and be perceived as a prominent feature in the landscape.
- 5.7.76 It is assumed that the National and District Level landscape character area background will not change between 2021 and 2032.

Assumptions in the Preparation of the 2032 Baseline

- 5.7.77 For the baseline 2032, in agreement with the arboricultural consultant's advice, it is assumed that tree growth for the planting proposals as part of the 2017 Planning Consent would be approximately 6-10m in the 11 years from 2021 to 2032. For existing vegetation present on the Site in 2021, tree growth would be assumed to be approximately 7.5-8m in 11 years, to a maximum height of 21 m, although in reality some species could be taller.
- 5.7.78 In 2032, it is assumed that:
- The extant 2017 Planning Consent for Huntspill Energy Park would have been constructed, along with the maturing planting proposals (in place for 11 years);
 - The approved Village Enhancement Scheme would be completed, providing an off-road permissive path between the villages of Puriton and Woolavington for walkers and cyclists;

- Two emerging residential Approved Developments (one on the edge of Puriton and one at Woolavington) would be completed (maximum heights assumed at 11.5m for 2-2.5 storey houses which are referenced in the applications for both sites); and
- The Hinkley connection project pylon run would be complete.

Assumptions for the Proposed Development

- 5.7.79 For stacks and flues, given that the final details of stacks and flues is unconfirmed at this stage, our working assumption is that they would be located on the large commercial unit(s) and the EON site. There are two scenarios within the assessment; stack heights of up to 10 m above the height of the commercial unit(s) are normally required in such facilities, however, in some, exceptional circumstances, stacks of up to 25 m are required, plus or minus 2 m from existing ground level. Therefore, it is assumed that 10 m stack heights are the most likely but 25 m are also assessed, plus or minus 2 m from existing ground level (as shown on the building heights plan). The number of stacks cannot be fixed at this stage. It is assumed that stacks would include a medium intensity red aviation light located as close as possible to the top of the structure.
- 5.7.80 In agreement with the arboricultural consultant's advice, tree growth within structure planting is assumed to be between 8-11.5m in 15 years.

Climate Change Assumptions

- 5.7.81 It is assumed that the buildings of HEP will need to comply with the 2013 Building Regulations at the Reserved Matters stage.
- 5.7.82 As the 2017 Planning Consent required implementation of a Surface Water Management Strategy to serve the development and manage rainfall on site, it is assumed that surface water flood risk on site for the 2032 baseline scenario will be very low. Risk from groundwater and reservoir flooding also remains unchanged from the current state of the environment.

Cultural Heritage Assumptions

- 5.7.83 Data used to compile this assessment consists of information derived from a variety of sources, only some of which have been directly examined for the purposes of this study. The assumption is made that this data, as well as that derived from other secondary sources, is reasonably accurate.
- 5.7.84 For the basis of this assessment, a conservative scenario has therefore been assumed whereby any below ground archaeological remains will be entirely lost.

5.8 Cumulative Effects

- 5.8.1 Given the approach as set out above, approved developments (or those considered likely to have been approved and implemented by 2032) are factored into the 2032 baseline, and therefore the assessment of likely significant cumulative effects with these developments is inherent to the assessment and is not reported separately.

5.9 Assessing Effects

Assessing Demolition and Construction Effects

- 5.9.1 The EIA has assessed the likely significant environmental effects that could occur during demolition and construction. The assessment of likely significant environmental effects during the construction phases has been based on available information and reasoned judgements

based on professional experience to enable the likely significant environmental effects to be identified.

- 5.9.2 Construction effects are likely to be temporary and intermittent, i.e. works will not occur in one location throughout the entire duration of the construction works. It should be noted however that construction works are considered to be temporary, however they could continue throughout the life of the LDO (up to 2032). The potential duration and intermittency of effects is identified as appropriate in the ES **Chapters 7-16** based on the information provided in **Chapter 4**.
- 5.9.3 In judging the significance of demolition and construction effects, it has been assumed that the DCEMP will be implemented to adequately address mitigation measures in relation to demolition and construction effects identified within **Chapters 7-16**.

Assessing Operational Effects

- 5.9.4 To provide an assessment that is generally consistent between topic chapters, the EIA has focused on assessing the likely significant environmental effects of the overall Proposed Development as shown on the Parameter Plans. This includes the assessment of both the beneficial and adverse effects of the proposed development.

The Risk of Major Accidents and/or Disasters

- 5.9.5 The Council agrees that the probability of natural disasters and major accidents can be scoped out of the ES. In respect of major accidents and disasters, those cited in the ES Scoping Report related to potential accidents during construction, a major flood event, road traffic accidents and pollution incidents. The Scoping Opinion requested that a clear cross-reference should be included in the ES to the relevant topic where the relevant information in relation to these potential risks are covered. These are as follows:
- Construction impacts – see **Chapter 9 Transport and Access; Chapter 10 Noise and Vibration; and Chapter 11 Air Quality;**
 - A major flood event – see **Chapter 13 Water Environment;**
 - Road traffic accidents - see **Chapter 9 Transport and Access;**
 - Pollution incidents - see **Chapter 4 Demolition, Construction and Site Management; and Chapter 13 Water Environment.**

5.10 Uncertainty and Limitations

- 5.10.1 The prediction of future effects inevitably involves a degree of uncertainty. In addition, given the flexibility required for this market-led LDO, the assessment is based on Parameter Plans and therefore there will be uncertainty on the detail of the nature of development being proposed. Where necessary, the technical chapters describe the principal factors giving rise to uncertainty in the prediction of likely significant environmental effects and the degree of the uncertainty.
- 5.10.2 Confidence in the predictions has been achieved by employing accepted assessment methodologies. Uncertainty inherent within the prediction has been described. The ES has sought to provide a robust assessment of the likely significant effects of the Proposed Development through the assessment of the Parameter Plans which show the maximum parameters of Proposed Development.
- 5.10.3 The COVID-19 global pandemic has had some implications for collecting and interpreting baseline data. Where applicable, this has been highlighted in the technical chapters, with

information provided on the proposed approach to address the implications and how these have been agreed with consultees (**Chapter 7-16**).

5.11 Mitigation

- 5.11.1 The incorporation of mitigation measures, which are measures to avoid, minimise or compensate for likely significant adverse effects, is an integral part of the design and EIA processes.
- 5.11.2 The EIA Regulations require an ES to contain: *“A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment”*.
- 5.11.3 A hierarchy of methods for mitigating significant adverse effects have been followed; these are, in order of preference:
- **Avoidance** – designing the Proposed Development in such a way that avoids effects on the environment (e.g., avoiding siting large scale commercial development in close proximity to existing residential communities.);
 - **Reduction** – design the development or employ construction methodologies such that significant effects identified are reduced (e.g. deployment of strategic landscaping to reduce visual impact); and
 - **Compensation** – providing off-site measures to compensate for harm where onsite mitigation has not been possible or sufficient (e.g., financial contributions towards local infrastructure managed through the investment plan via business rates retention and recycling into implementation and delivery).

Embedded Mitigation

- 5.11.4 There is a distinction between mitigation that is incorporated or ‘embedded’ into the design of the development (embedded mitigation) and mitigation that is subsequently identified to prevent, reduce, or offset any remaining significant adverse effects (further mitigation). Embedded mitigation may include, for example, the range and or colour of materials in large scale buildings to mitigate visual effects, or incorporation of sustainable drainage attenuation.
- 5.11.5 Embedded mitigation evolves through the iterative design process and early consideration of the likely significant impacts is essential to incorporating suitable embedded mitigation measures.
- 5.11.6 As part of the design process that informed the LDO, suitable mitigation measures were incorporated into the Proposed Development to mitigate potentially significant environmental effects. This mitigation is termed “embedded mitigation” and has been considered within each of the assessments in this ES.
- 5.11.7 The Design Guide identifies design principles for a deliverable scheme that responds to the Site’s technical constraints and opportunities. Mitigation set out in this ES has been incorporated into the Design Guide.

Further Mitigation

- 5.11.8 Further mitigation measures are defined as those which require additional activity to be achieved to either reduce environmental impacts and/or to support achieving local and national policy requirements, are identified through carrying out assessments and inform management plans to be operationalised, and do form part of the scheme development. For

example, this will include specific measures to control environmental effects through construction environmental management or travel plans.

- 5.11.9 Further mitigation measures have been identified through the EIA process. Such mitigation is identified in this ES along with how they are proposed that they be secured, for example the Design Guide.
- 5.11.10 The embedded mitigation and further mitigation for the Proposed Development is set out in **Section 7** and **Section 9** respectively within each topic chapter.

Enhancement

- 5.11.11 The EIA Regulations do not require an Environmental Statement to document any enhancement measures that may be delivered by a developer or a development. However, it is valid to capture and report on positive outcomes that are sought to meet the policy tests of the local planning authority, for example in responding the climate change, economic development, Bridgwater Vision and the requirement to agree local labour agreements.
- 5.11.12 As such any enhancement measures delivered by the Proposed Development are not identified in this ES (or relied upon in judging the significance of effects) unless such enhancement measures are a fundamental part of the Proposed Development that are consented as part of the LDO (enhancing public transport accessibility through the reinstatement of the rail head, economic transformation, positive climate action, employment and skills).

5.12 Residual Effects

- 5.12.1 Residual effects are the likely significant environmental effects that remain after mitigation measures have been incorporated and secured through the LDO process. Therefore, the mitigation proposed by the development will ensure that the identified unmitigated effects will not occur in practice. These are fully described in the ES.
- 5.12.2 To provide an objective assessment of residual effects the significance of residual effects has been determined and is identified in the ES. This allows for comparison of likely significant effects between topics and also strengthens the assessment of impact interactions.

5.13 Significance Criteria

- 5.13.1 The EIA Regulations require that the ES describes likely significant effects of the Proposed Development. However, there is no legal definition of a likely significant environmental effect and interpretations differ. In accordance with the European Commission's Guidance on Scoping (2017), this ES will provide information on those effects that will influence decision-making or those where there is uncertainty about their magnitude. This approach is consistent with best practice for EIA in the UK.
- 5.13.2 The significance of an effect is typically the product of two factors: the value of the environmental resource affected and the magnitude of the impact, while consideration may also need to be given to the likelihood of an effect occurring. A significant effect may arise as a result of a slight impact on a resource of national value or a severe impact on a resource of local value. In addition, the accumulation of many non-significant effects on similar local resources geographically spread throughout the scheme may give rise to an overall significant effect on a receptor. An example of this might be the loss of ecological habitat of low value at many locations.
- 5.13.3 This approach to assessing and assigning significance to an environmental effect relies upon such factors as legislative requirements, guidelines, standards and codes of practice, consideration of the EIA Regulations, the advice and views of statutory consultees and other

interested parties and expert judgement. The following questions are relevant in evaluating the significance of likely environmental effects:

- Which risk groups are affected and in what way?
- Is the effect reversible or irreversible?
- Does the effect occur over the short, medium, or long term?
- Is the effect permanent or temporary?
- Does the effect increase or decrease with time?
- Is the effect of local, regional, national, or international importance?
- Is it a positive, neutral, or adverse effect?
- Are health standards or environmental objectives threatened?
- Are mitigating measures available and is it reasonable to require these?

5.13.4 Specific significance criteria have been prepared for each specialist topic as appropriate, based on the above and the generic criteria set out in **Table 5.1**.

5.13.5 Effects that are described as ‘substantial’, ‘major’ or ‘moderate’ are determined to be *significant*; and effects that are described as ‘minor’ or ‘negligible’ are determined to be *not significant*.

	Level of Effect	Criteria
<i>Significant</i>	Substantial	These effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change at a county scale site or feature may also enter this category.
	Major	These effects are likely to be important considerations at a district scale and may become key factors in the decision-making process.
	Moderate	These effects, while important at a local scale, are not anticipated to be key decision-making issues.
<i>Not significant</i>	Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process.
	Negligible or No Effect	These effects are imperceptible, or within normal bounds of variation, or in the margins of forecasting errors. Such effects should not be considered by the decision-maker.

Table 5.1 Significance Criteria

5.14 Impact Interactions

5.14.1 **Chapter 17** provides the assessment of impact interactions, i.e. receptors being affected by more than one environmental effect and therefore potentially being subject to a more significant combined effect than the individual effects reported in each of the topic chapters.

5.14.2 The approach adopted for the assessment is in accordance with the methodology set out above, with further details provided in **Chapter 17**.

5.15 Monitoring

- 5.15.1 The 2017 EIA Regulations introduce the requirement for the monitoring of significant residual adverse environmental effects and that a schedule of proposed monitoring should be set out in an ES.
- 5.15.2 Each chapter of the ES therefore identifies the proposed monitoring arrangements, which should be proportionate, for any residual significant adverse effects identified. A summary of mitigation and monitoring requirements identified in each topic chapter is provided in **Chapter 18**.

6 Planning Policy Context

6.1 Introduction and Background

- 6.1.1 The Gravity Site has a long contextual history. The Site was shut by BAE Systems in 2008, following sole occupation and operation as a manufacturing facility of national importance. Sedgemoor District Council (SDC) took the opportunity to ensure that the Site would deliver maximum benefit on its redevelopment, in accordance with an economic development led strategy to transform the local economy. This was necessary due to a number of industrial closures at the time, resulting in significant employment loss. Economic evaluation at the time, and indeed since, has illustrated the low value – low wage nature of the Sedgemoor economy and the employment reliance on sectors which are at risk in the future from decline and employment loss due to economic restructuring as well as advances in automation and robotics. It is therefore vital to consider the Site as part of a wider local, regional and national policy and delivery context.

6.2 Key Local Policy and Strategy Context

- 6.2.1 From a locality perspective it is important to note SDC's corporate priority for inward investment and growth, as well as the drive for transformation through SDC's economic development strategy, most recently refreshed in September 2020, and the Bridgwater Vision within which Gravity is identified as a key transformational project. In this context these economic led considerations and the relevant economic development policies associated with them should be afforded significant weight within the assessment of the scheme.
- 6.2.2 SDC's Corporate Strategy 2020 – 2021 identifies Growth & Infrastructure as one of the three priority themes to deliver all their corporate objectives. In particular, the priority to grow the economy of Sedgemoor will be achieved by ensuring supply of employment land, encouraging businesses to locate to Sedgemoor and working to increase the skill level of the workforce. Gravity will support the delivery of all of these objectives. Similarly, objectives such as working toward carbon neutrality by 2030, delivering the housing programme, creating additional leisure opportunities and creating a clean and healthy environment to promote wellbeing are also all aligned with Gravity's own vision and objectives, particularly through the Clean and Inclusive Growth Strategy.
- 6.2.3 SDC's Economic Development Strategy 2020 – 2050 explains that by 2050 Sedgemoor will be a clean growth and energy link on the M5 "Innovation Highway" which connects an environmental, health and marine digital hub to the south and a high-tech transport, cybersecurity, health, and data-driven hub to the north. The Economic Development Strategy identifies the prominence of Gravity as the key project within the District and states that it offers further long-term opportunity for the transformation of Sedgemoor's economy.
- 6.2.4 The Strategy confirms Gravity's vision is wholly aligned with the UK and local industrial strategies and the Build Back Better plan for growth, in aiming to drive productivity through the delivery of an internationally leading innovation campus that is underpinned by clean growth. The Strategy confirms that Gravity will support high-value business across: low carbon energy generation; manufacturing; electric vehicles; robotics; artificial intelligence, data analytics, R&D and the creative industries. Importantly the Strategy also notes that Gravity will not only create an inclusive environment, with leisure facilities and amenities accessible to both employees and the wider local community, but its development will ensure design and economic activity that does not compromise the quality of the natural environment.
- 6.2.5 Somerset's Climate Emergency Strategy, developed jointly by the five Somerset local authorities, sector experts and external partners, was formally adopted by all five Somerset Councils in November 2020. The aim of the strategy is to reduce carbon emissions in the county and make Somerset a county resilient to the inevitable effects of Climate Change. The

strategy sets ambitious goals for Somerset to become a carbon neutral county by 2030 and also outlines what the five Councils intend to do to address the most important issues around the Climate Emergency. The declarations made within the Climate Emergency Strategy include achieving carbon neutrality by 2030 and building resilience for, or adapting to, the impacts of a changing climate. The Strategy describes many objectives which are aligned with Gravity and describes a number of benefits linked to delivering development in this way across economic, social, and environmental areas.

- 6.2.6 From a wider perspective, the temporary nature and impact of nationally significant infrastructure projects (NSIPs), including Hinkley Point C and its Connection Project, in creating investment and confidence in the locality, and drawing in labour from the wider region, is relevant to the ambition and transformational nature of the Gravity site in securing long term and positive change to sustain employment into the future. Whilst NSIPs are linked to the local plan through the need for mitigation, these projects effectively sit within a parallel planning regime. Nonetheless, their presence and impacts on the locality and its economy is a key factor to consider in the economic assessment to ensure legacy and continuing benefit as well as labour force transition.
- 6.2.7 The Gravity site was designated as an Enterprise Zone (EZ) in 2015, becoming live in April 2017 and operational as an EZ in April 2017. At that point the local authorities (Sedgemoor District Council, Somerset County Council) and the Heart of the SW LEP signed an MoU with government regarding the priorities for delivery of the site and linked to an Implementation Plan. That Implementation Plan originally indicated that delivery should commence on the site in early 2020, so delivery is already behind schedule meaning the delivery of the proposed LDO is also a priority in terms of the delivery of the EZ.
- 6.2.8 Gravity is also ensuring that the project's journey aligns to global standards including the UN Sustainable Development Goals (UNSDG) through embedding Environmental and Social Governance (ESG) practices into the Gravity Clean and Inclusive Growth Strategy. Evaluation of the UN SDGs has resulted in 12 goals being identified as highly relevant and applicable to Gravity, and these have been organised into five key themes as set out below in **Figure 6.1**.

Figure 6.1: Five Key Environmental and Social Governance Themes



- 6.2.9 This section sets out the various local policy documents which consider and have influenced the planning process for the Site and summarises the planning history of the Site.
- 6.3 Policy Hierarchy
- 6.3.1 The Sedgemoor Development Plan is made up of the Sedgemoor Local Plan 2011-2032. It is supported by a suite of Supplementary Planning Documents (SPDs) and other adopted strategies and guidance. The Sedgemoor Local Plan sets out the policy framework for future

development in the District, including provision of housing, employment, retail and other facilities and infrastructure. It was adopted in February 2019. It therefore forms part of the development plan for the District and is a main consideration in the determination of planning applications with appropriate weight therefore being afforded to those policies ahead of any out of date or older policy documents. A neighbourhood plan is currently in preparation following designation, but this is at a relatively early stage in preparation with consultation on a draft still to take place.

- 6.3.2 The Local Plan relates to the whole District and provides a strategy for delivering growth up to 2032. Below the Local Plan sit a number of adopted SPDs, including an SPD relating to the Site itself to which limited weight should now be afforded, strategies (including the Sedgemoor Transport Investment Strategy 2050, for example) and guidance. The National Planning Policy Framework (the Framework) is also a key material consideration in decision making in Sedgemoor. Specific to the topic of waste is the Somerset Waste Core Strategy, which covers the entire county. The Local Plan and pertinent associated considerations for the Gravity LDO, starting with the national context and the Framework, are set out below.

6.4 Build Back Better: our plan for growth

- 6.4.1 The aim of the UK Industrial Strategy was to boost productivity by backing businesses to create good jobs and increase the earning power of people throughout the UK with investment in skills, industries and infrastructure.
- 6.4.2 In the 4 years since the strategy was published, the UK's business and economic environment has changed. Creating and supporting jobs remains the Government's central economic focus, but helping to drive growth in existing, new and emerging industries is also a priority. This is why the policy approach transitioned the Industrial Strategy into the Plan for Growth and its related strategies in March 2021.
- 6.4.3 The plan to build back better takes a transformational approach, tackling long-term problems to deliver growth that creates high-quality jobs across the UK and makes the most of the strengths of the Union. The plan states that we must retain our guiding focus on achieving the people's priorities: levelling up the whole of the UK, supporting our transition to net zero, and supporting our vision for Global Britain. Sedgemoor is itself identified as a Tier 1 priority area for levelling up.
- 6.4.4 The Plan states that this will be achieved by building on three core pillars of growth, across infrastructure, skills and innovation. These pillars are heavily focused on levelling up, linked to the Government's 10 Point Plan for a Green Industrial Revolution and driving long-term productivity improvements.
- 6.4.5 Gravity is particularly well placed to support these objectives, which are well aligned with the Clean and Inclusive Growth Strategy and the objectives therein. In particular a number of the Gravity 50 objectives set out within the Clean and Inclusive Growth Strategy are directly aligned with the Government's 10 Point Plan.

COP26

- 6.4.6 The Government acknowledges that the threat of climate change demands a step change in both the breadth and scale of ambition globally, as well as domestically. In November 2021, the UK will host the UN's annual climate change conference, COP26, in Glasgow, where the UK's leadership in tackling climate change, including in transport, will be showcased on a global stage. The Government has committed that the UK will continue to work with all to increase climate action, build resilience and cut emissions. They state that at COP26 they will bring together governments, cities, industry, businesses, and civil society to deliver shared high ambition and accelerate the shift to a zero-carbon future.

Clean Growth Strategy

- 6.4.7 Sitting beneath the Build Back Better Plan are 4 Grand Challenges focused on the global trends which will transform our future, of which Clean Growth is one. Clean growth means growing our national income while cutting greenhouse gas emissions. Achieving clean growth, while ensuring an affordable energy supply for businesses and consumers, is at the heart of the UK's Industrial Strategy. It will increase our productivity, create good jobs, boost earning power for people right across the country, and help protect the climate and environment upon which we and future generations depend.
- 6.4.8 In addressing the Clean Growth Grand Challenge Government state that it is the intention to maximise the advantages for UK industry from the global shift to clean growth – through leading the world in the development, manufacture and use of low carbon technologies, systems and services that cost less than high carbon alternatives.
- 6.4.9 The move to cleaner economic growth – through low carbon technologies and the efficient use of resources – is one of the greatest industrial opportunities of our time. By one estimate, the UK's clean economy could grow at four times the rate of GDP. Whole new industries will be created and existing industries transformed as we move towards a low carbon, more resource-efficient economy. The UK has been at the forefront of encouraging the world to move towards clean growth and the UK Government is determined to play a leading role in providing the technologies, innovations, goods and services of this future.
- 6.4.10 The Gravity Vision and various associated Strategies, including the Clean and Inclusive Growth Strategy, are focused on addressing this Clean Growth Grand Challenge whilst delivering an exemplar project and template for future development to support the UK in addressing the core elements of the Strategy whilst delivering transformational growth and supporting levelling up objectives.

Decarbonising Transport: A Better Greener Future

- 6.4.11 Transport is the largest contributor to UK domestic greenhouse gas (GHG) emissions, responsible for 27% in 2019. International aviation and shipping are not included in this figure. Domestic GHG emissions from transport have been broadly flat for the last 30 years, even as those of other sectors have declined. Better engine efficiency has been made up for by increasing numbers of journeys; the growth of electric and hybrid vehicles has been made up for by the growth in diesel and petrol SUVs. The UK must deliver a step change in the breadth and scale of our ambition on transport emissions to reach net zero. The measures we use to decarbonise transport must also deliver the vast wider benefits available during this change, improving air quality, noise, health, reducing congestion and delivering high-quality jobs and growth for everyone right across the UK. The need to limit global warming to well below 2°C and to pursue efforts to limiting to 1.5°C means the UK Government is committed to moving as far, and as fast, as possible. The document, Decarbonising Transport: A Better Greener Future sets out the Governments plans to deliver on these commitments.
- 6.4.12 "Decarbonising Transport: Setting the Challenge", published in March 2020, brought together existing work to reduce emissions across all forms of transport, and for the first time laid out the scale of the additional reductions needed to deliver transport's contribution to legally binding carbon budgets and delivering net zero by 2050. Sixteen months on, Decarbonising Transport sets out how the UK will deliver those emissions reductions and the associated benefits that will be realised from it across the UK. In preparing this document Government have engaged extensively with a large range of stakeholders to inform development of the plan including through virtual workshops, written contributions, online feedback, and the Net Zero Transport Board.
- 6.4.13 Given the rate of technological advancement and uncertainty in the precise mix of future zero emission solutions, and the probability of significant changes in travel behaviour over the

years ahead, the plan cannot precisely plot each individual step to fully decarbonising transport modes over the next 30 years. It does however set out a series of actions and timings that will decarbonise transport by 2050 and deliver against carbon budgets along the way. The government has committed to stretching carbon reduction targets up to the end of the Sixth Carbon Budget in 2037 and by 2050. As the largest emitting sector, transport will need to make a sizeable contribution if these targets are to be met. Depending on progress in the sector at some point(s) this may require additional targeted action (such as steps to reduce use of the most polluting cars and tackle urban congestion) to enable these targets to be met. The plan states that the Government will regularly review progress against targets, continue to adapt and take further action if needed to decarbonise transport. They will publish reports on progress and review the pathway at least every five years.

6.5 Planning for the Future White Paper

- 6.5.1 The Planning for the Future White Paper, published in August 2020, described the challenge we face in the planning process as one which is an inefficient, opaque process delivering poor outcomes. The Paper describes that the planning system is central to our most important national challenges: tackling head on the shortage of beautiful, high quality homes and places where people want to live and work; combating climate change; improving biodiversity; supporting sustainable growth in all parts of the country and rebalancing our economy; delivering opportunities for the construction sector, upon which millions of livelihoods depend; the ability of more people to own assets and have a stake in our society; and our capacity to house the homeless and provide security and dignity.
- 6.5.2 However, the Paper describes that it is too complex given the planning system we have today was shaped by the Town and Country Planning Act 1947, which established planning as nationalised and discretionary in character. Since then, decades of reform have built complexity, uncertainty and delay into the system. It also notes that planning decisions are discretionary rather than rules-based with nearly all decisions to grant consent undertaken on a case-by-case basis, rather than determined by clear rules for what can and cannot be done. This makes the English planning system and those derived from it an exception internationally, and it has the important consequences of increasing planning risk, pushing up the cost of capital for development and discouraging both innovation and the bringing forward of land for development.
- 6.5.3 The Paper notes that planning system needs to be better at unlocking growth and opportunity in all parts of the country, at encouraging beautiful new places, at supporting the careful stewardship and rebirth of town and city centres, and at supporting the revitalisation of existing buildings as well as supporting new development. Part of the response to these challenges is to consolidate other existing routes to permission including simplified planning zones and enterprise zones to ensure efficiency in the delivery of important development, such as Gravity.

6.6 National Planning Policy Framework

- 6.6.1 At a National Level planning policy is set out within the National Planning Policy Framework, revised in July 2021 (the Framework). The Framework explains that the purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs. The Framework continues to explain that in order to achieve this aim the planning system has three overarching objectives; an economic objective; a social objective and an environmental objective. The framework must be read as a whole including footnotes and it is very clear that the UK Government Industrial Strategy forms a key part of it.
- 6.6.2 The Framework states, at paragraph 81, that significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs

and wider opportunities for development. The approach taken should allow each area to build on its strengths, counter any weaknesses and address the challenges of the future. This is particularly important where Britain can be a global leader in driving innovation, namely in the Grand Challenge areas set out within the Industrial Strategy (including artificial intelligence and big data; clean growth; future mobility), and in areas with high levels of productivity, which should be able to capitalise on their performance and potential. Planning policies should:

- a) set out a clear economic vision and strategy which positively and proactively encourages sustainable economic growth, having regard to Local Industrial Strategies and other local policies for economic development and regeneration;
- b) set criteria, or identify strategic sites, for local and inward investment to match the strategy and to meet anticipated needs over the plan period;
- c) seek to address potential barriers to investment, such as inadequate infrastructure, services or housing, or a poor environment; and
- d) be flexible enough to accommodate needs not anticipated in the plan, allow for new and flexible working practices (such as live-work accommodation), and to enable a rapid response to changes in economic circumstances.

- 6.6.3 At paragraph 83 the Framework also states that planning policies and decisions should recognise and address the specific locational requirements of different sectors. This includes making provision for clusters or networks of knowledge and data-driven, creative, or high technology industries, and for storage and distribution operations at a variety of scales and in suitably accessible locations.
- 6.6.4 It explains that these objectives should be delivered through the preparation and implementation of plans and the application of the policies in the Framework and that planning policies and decisions should play an active role in guiding development towards sustainable solutions. The Framework contains a presumption in favour of sustainable development which should be applied to both plans and planning decisions.
- 6.6.5 Under the heading of 'tailoring planning controls to local circumstances' at paragraph 51, the Framework explains that local planning authorities are encouraged to use Local Development Orders to set the planning framework for particular areas or categories of development where the impacts would be acceptable, and in particular where this would promote economic, social or environmental gains for the area.
- 6.6.6 In the context of building a strong and competitive economy the Framework states that planning policies and decisions should help create the conditions in which businesses can invest, expand, and adapt. The Framework explains that planning decisions should recognise that Sites to meet local business and community needs in rural areas may have to be found adjacent to or beyond existing settlements, and in locations that are not well served by public transport. In these circumstances it will be important to ensure that development is sensitive to its surroundings, does not have an unacceptable impact on local roads and exploits any opportunities to make a location more sustainable (for example by improving the scope for access on foot, by cycling or by public transport). Of particular relevance here, the use of previously developed land should be encouraged where suitable opportunities exist.
- 6.6.7 Importantly in the context of Gravity, significant weight should also be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development. The approach taken should allow each area to build on its strengths, counter any weaknesses and address the challenges of the future. This is described as being particularly important where Britain can be a global leader in driving innovation.

6.7 Bridgwater Vision

- 6.7.1 In 2009 SDC, working alongside a range of partners, published the first iteration of the Bridgwater Vision. The aim of the Bridgwater Vision was to develop a 'spatial' vision for Bridgwater in order to bring about transformation and help to create distinctiveness with a re-vitalised image and economic base, effectively repositioning the town over the subsequent 50-year period to 2060. The Vision for Bridgwater set out in the Bridgwater Vision explains that, *'In 2060 Bridgwater will be an energy conscious town known for its ambitious approach to sustainability and low carbon living. Bridgwater will be seen as a place that has been re-energised into a confident town...'*
- 6.7.2 This first iteration of the Bridgwater Vision describes the Gravity Site as one of the key characters areas to deliver that Vision and one of the key transformational projects within the area, also reflected within the Local Plan. It explains that the Gravity Site will be a significant employment area linked to a renewable, low carbon energy source. It continues to describe that the employment area would benefit from on-Site rail links, a bespoke travel plan service for workers from Bridgwater town centre and the promotion of cycle tracks and footpaths through the Site providing links to Puriton, Woolavington and Bridgwater, encouraging greater use of non-vehicular transport modes.
- 6.7.3 The Bridgwater Vision also explains that opportunities to incorporate other uses on the Site would also be explored including leisure uses, key worker / specialist / market housing and areas of open space for recreation. Under a specific section of the report on housing on the Gravity Site the Bridgwater Vision states that housing development in this area would be dependent on the long-term future of the Site and that potentially new housing development could be linked to key worker accommodation, linked to specific employment opportunities on the Site.
- 6.7.4 In 2015 the Bridgwater Vision was refreshed to provide an update on the successes delivered over the intervening 6-year period. The story was positive with many successes and progress made toward delivering a number of the identified objectives and outcomes. Gravity continued to be identified as a priority, maintaining detail on SDC's ambitions for the Site, although it did state that at that point there was significant uncertainty about the future of this Site. The concept of Huntspill Energy Park was described, and the Vision anticipated it could be a significant employment development for B1 (business) and B2 (general industrial) energy related uses for the town linked to a renewable low carbon energy source.
- 6.7.5 The refreshed Vision explained that the then owner, BAE Systems, was considering initial ideas for potential energy uses, but that the Site could also provide a unique opportunity to the support services and industries related to a new generation of nuclear investment, possibly to accommodate foreign direct investment to supply components. Again, housing on the Site, or in its wider locale, was also considered dependent on the long-term future of the Site.
- 6.7.6 Both iterations of the Bridgwater Vision were adopted as a material consideration in the planning process and the transformational / priority schemes identified within it (including Gravity) are directly referenced in the Local Plan as a result. Given the clear direction given in the Framework that that significant weight should be placed on the need to support economic growth and productivity, the economic benefits that this transformational project will deliver should be afforded significant weight.

6.8 Sedgemoor Local Plan 2019

- 6.8.1 The current Sedgemoor Local Plan was adopted in February 2019 and does not contain any specific allocation at the site as it was considered to be a commitment, given planning consent was granted at the site (42/13/00010) in November 2017. The site is however still referenced positively within the Local Plan, in a number of places. Those relevant policies and policies

which relate to the site and aspects of it should be afforded the most weight in the planning policy consideration of the LDO.

- 6.8.2 Policy B1 supports and protects the transformational projects set out within the Bridgwater Vision with the Gravity site specifically mentioned as one of those projects under the 'Local Projects' banner. Policy B16 identifies the transport projects which are required to support the delivery of the Local Plan objectives and priorities for Bridgwater. Included within the list of priority transport schemes is the Gravity access road and reinstatement of the rail head at Gravity.
- 6.8.3 The Major Infrastructure Projects policies within the Local Plan also makes reference to the Gravity site. For the purposes of the Local Plan, Major Infrastructure Projects (MIP's) are defined as those infrastructure projects that would require Environmental Impact Assessment (EIA) as set out in Schedules 1 and 2 of the EIA Regulations 1999 (except predominantly residential schemes), and include those defined as Nationally Significant Infrastructure Projects (NSIP's) in the Planning Act 2008. In particular, energy generation at Gravity is identified as a potential MIP, given the significant areas of the site safeguarded for energy generating uses and the lack of any consent / detail regarding the specifics of that energy generation and its overall scale. This is no longer relevant to the proposition at Gravity through this LDO process however.
- 6.8.4 The approach taken in the Local Plan to consider the site as a commitment meant that the jobs to be delivered at the site did not have to be assessed in terms of any impact upon housing need within the locality, or to put it another way, the site under the current consent could deliver approximately 4000 jobs but there are no new homes planned to accommodate the workforce.

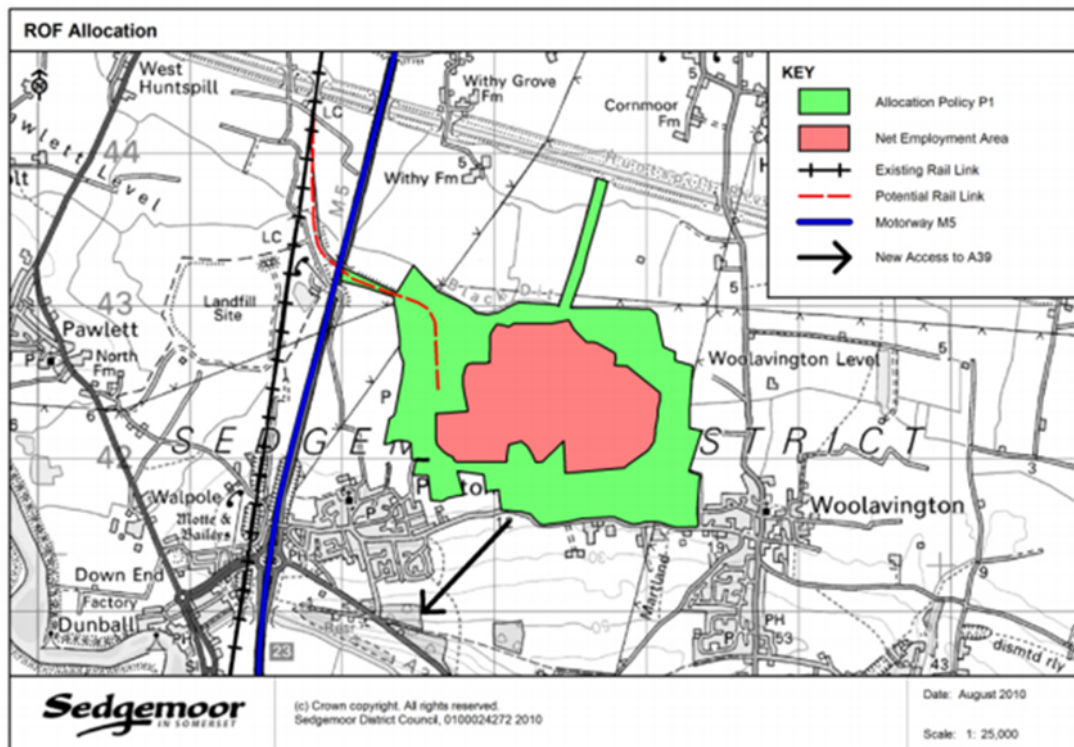
6.9 Core Strategy

- 6.9.1 The Sedgemoor Core Strategy was adopted in September 2011 and, although now superseded by the new Local Plan and of limited weight in terms of the planning considerations of the LDO, included an allocation for an 'Energy Park' on the Gravity site (Policy P1 Bridgwater), with priority given to industrial uses including renewable or low carbon energy generation and other energy-related or complementary uses, including green technologies, supply components and support services. This allocation was based upon assumptions made at the time regarding the opportunity the Site presented, without any market interface, and identified approximately 90 hectares of developable employment land for a range and mix of employment uses. **Figure 6.2** below is the allocation as identified within Sedgemoor Core Strategy. At this time, SDC's application for EZ status had not been made.

Figure 6.2: Site allocation plan included within SDC Core Strategy 2011

ROF Allocation Policy P1

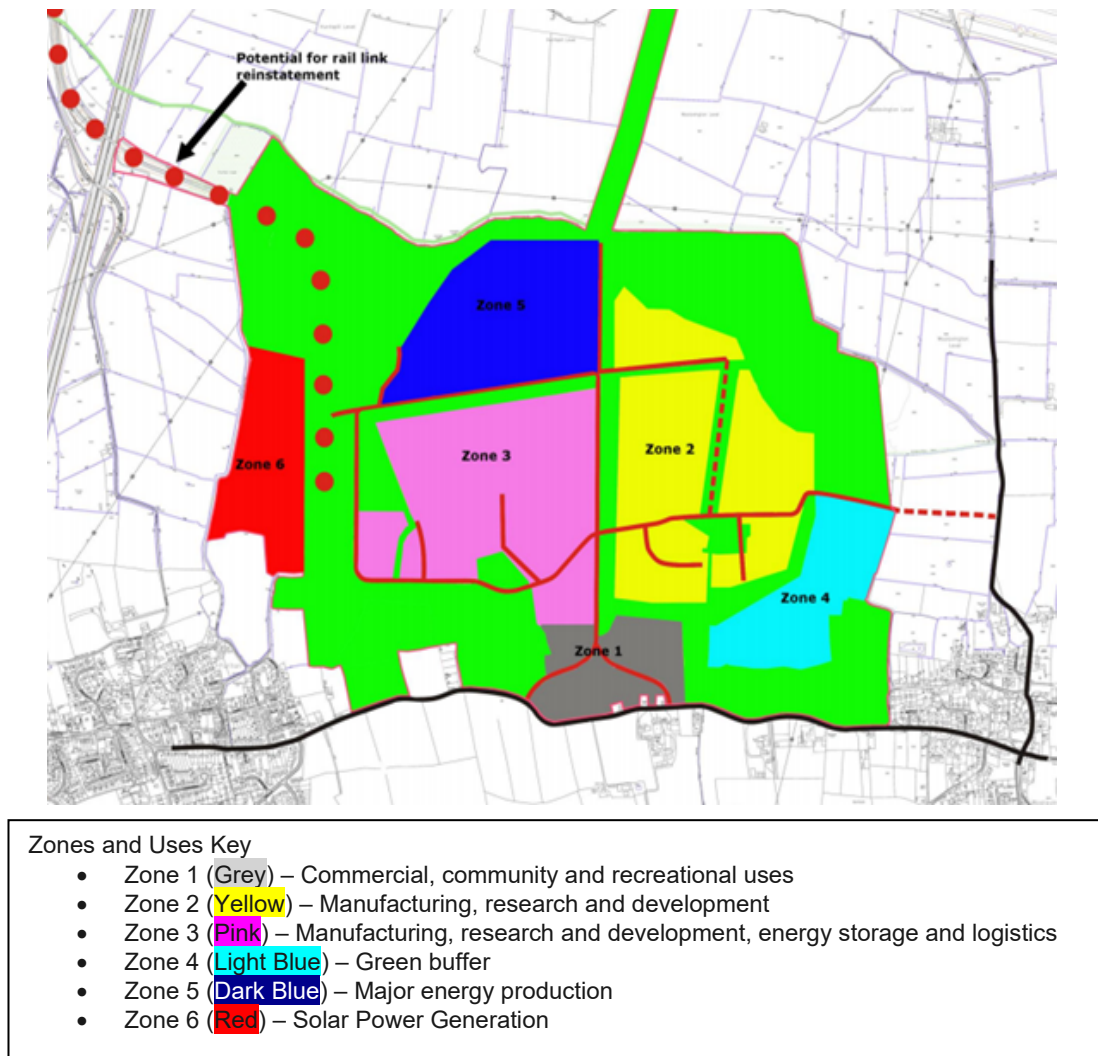
Map 13.2 ROF Allocation



6.10 Puriton Energy Park SPD

- 6.10.1 In order to elaborate and provide greater detail on policies within the Core Strategy relating to the 'Energy Park', SDC adopted the Puriton Energy Park SPD in March 2012. The SPD explains that the Site covers an area of 171 hectares within the enclosed security fence and that BAE Systems owned another 104 hectares of farmland surrounding the Site, outside the security fence. Therefore, the whole area the SPD covers is 275 hectares, which includes the now constructed solar farm to the west of the Site. This solar farm is no longer connected to Gravity. **Figure 6.3** below is an extract from the SPD and indicates the proposed developable areas and potential uses within each of those zones, as set out within the SPD.

Figure 6.3: Developable areas and use zones set out within the SPD.



- 6.10.2 The SPD provided a framework for assessing planning applications for the Site and focused on the main development objectives required to deliver the Energy Park. The SPD was informed by technical studies to gain an understanding of Site constraints and opportunities. The SPD is clear to stress that it does not set out full details of how the Site will be redeveloped, for example detailed building plans, road layouts and known end users. Instead, it sets out high level parameters against which detailed schemes submitted to SDC will be assessed. The SPD is therefore described as high-level planning tool that sets out the important requirements and considerations that should be borne in mind when preparing planning applications. Importantly, the SPD clearly states that it does not set out what the Site will ultimately look like or who will occupy it, which it states is the role of subsequent planning applications.
- 6.10.3 The SPD has been used at Gravity to date in order to inform the Strategic Design Code already approved for the existing hybrid consent at the site (42/13/00010) under Condition 29 attached pursuant to that consent.
- 6.10.4 Notwithstanding this, since 2012, much has changed in terms of the national policy and political context, with a new Framework, a stronger focus on EZ delivery, Industrial Strategy

and Clean Growth, The SPD is therefore somewhat outdated in places, however, does provide some valuable input in terms of design principles.

6.11 Relevant Sedgemoor Local Plan Policies

6.11.1 The following policies within the Sedgemoor Local Plan 2011-2032 are relevant to each of the topics covered in this scoping report.

Topics currently proposed to be scoped into EIA	
Topic	Relevant Local Plan Policies
Economics	<p>S2 – Spatial Strategy for Sedgemoor</p> <p>CO3 – Brownfield Sites in the Countryside</p> <p>B1 – Bridgwater Vision Transformational Projects</p> <p>B7 Employment</p> <p>D15 Economic Prosperity</p> <p>D16 Safeguarding Existing Employment Land and Buildings</p> <p><i>Other relevant strategies/considerations:</i></p> <p>Sedgemoor Economic Development Strategy 2050</p> <p>Bridgwater Vision</p>
Health, Social and Wellbeing	<p>S2 – Spatial Strategy for Sedgemoor</p> <p>B1 Bridgwater Vision Transformational Projects</p> <p>B14 Education</p> <p>B17 Servicing Facilities</p> <p>D2 Promoting High Quality and Inclusive Design</p> <p>D5 Housing Mix</p> <p>D6 Affordable Housing</p> <p>D7 Care Homes and Specialist Accommodation</p> <p>D25 Protecting Residential Development</p> <p>D27 Education Provision</p> <p>D28 Health and Social Care</p> <p>D34 Outdoor Public Recreational Space and New Residential Areas</p>
Transport and Access	<p>S3 Infrastructure Delivery</p> <p>S4 Sustainable Development Principles</p>

	<p>B16 Transport</p> <p>D13 Sustainable Transport and Movement</p> <p>D14 Managing the Transport Impacts of Movement</p> <p>Other relevant strategies/considerations:</p> <p>Sedgemoor Transport Investment Strategy 2050</p>
Noise and Vibration	<p>D24 Pollution Impacts of Development</p> <p>D25 Protecting Residential Amenity</p>
Air Quality	<p>S4 Sustainable Development Principles</p> <p>D24 Pollution Impacts of Development</p>
Biodiversity	<p>D20 Biodiversity and Geodiversity</p> <p>D21 Ecological Networks</p> <p>D23 Bat Consultation Zones</p> <p>D29 Protection and Enhancement of Existing Green Infrastructure Resources</p>
Water Environment	<p>S5 Mitigating the Causes and Adapting to the Effects of Climate Change</p> <p>B15 Flood Defence</p> <p>D1 Flood Risk and Surface Water Management</p>
Landscape and Visual	<p>D19 Landscape</p> <p>D22 Trees and Woodland</p> <p>D29 Protection and Enhancement of Existing Green Infrastructure Resources</p> <p>D30 Green Infrastructure Requirements in New Development</p>
Climate Change	<p>S4 Sustainable Development Principles</p> <p>S5 Mitigating the Causes and Adapting to the Effects of Climate Change</p>
Archaeology and Cultural Heritage	<p>D26 Historic Environment</p>
Topics currently proposed to be scoped out of EIA	
Ground Conditions and Contamination	<p>D24 Pollution Impacts of Development</p>
Lighting	<p>D24 Pollution Impacts of Development</p> <p>D25 Protecting Residential Amenity</p>
Arboriculture	<p>D22 Trees and Woodland</p>

	D29 Protection and Enhancement of Existing Green Infrastructure Resources D30 Green Infrastructure Requirements in New Developments
Waste	Somerset Waste Core Strategy
Sustainability and Energy	S4 Sustainable Development Principles S5 Mitigating the Causes and Adapting to the Effects of Climate Change

7 Economics

7.1 Introduction

- 7.1.1 This chapter presents the findings of a desk-based assessment of the likely significant economic effects of the Proposed Development.
- 7.1.2 This chapter sets out the methods used in the assessment, the relevant economic baseline context, including the 2032 baseline, and the likely significant effects on economic receptors resulting from the demolition, construction, and operation of the Proposed Development. Mitigation measures embedded within the Proposed Development are also considered, as well as those which are additionally required to prevent, reduce, or offset adverse effects.
- 7.1.3 This assessment considers economic factors and draws on findings of other chapters within this ES, including: **Chapter 8 - Health, Social and Wellbeing** and **Chapter 9 - Transport and Access**.
- 7.1.4 This chapter has been prepared by Stantec. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appoint to prepare this ES is provided in **Appendix 1.6**.
- 7.1.5 The appendices associated with this chapter are:
- **Appendix 7.1** Labour Market Study Area
 - **Appendix 7.2** Housing Market Study Area

7.2 Policy, Legislation, Guidance and Standards

- 7.2.1 A brief overview of relevant national and local planning and economic policy is provided below to set the context for the chapter. A more generic summary of planning policy is provided in **Chapter 6**.
- 7.2.2 The Proposed Development closely aligns with the planning policy context and the local authority priorities for investment and growth, creating a positive culture which is pro-business and supports the long-term economic growth and prosperity of the region in a clean and inclusive manner.
- 7.2.3 The purpose of the Proposed Development is to be transformational and bring new businesses to the region which can be sustained into the future in clean growth sectors. Given the transformational agenda, workforce and supply chain development will be important to help the existing community and business transition to support new sectors, as well as the area welcoming new community members and businesses to diversify the economic base and improve its resilience. The existing business landscape, specifically consortia developed with the Hinkley Point C project, have already created new corporate structures and processes to support Gravity with both Somerset Larder, Host Somerset, and Somerset Passenger Transport Solutions providing services to attract new occupiers. The full occupation and management of Gravity smart campus will obviously require a full range of business services for its occupiers, from training to landscape management, accountancy, food and drink, transport, leisure services, hotels and so on. A Business Charter directs occupiers to seek to utilise local business and this will be through their own procurement processes.
- 7.2.4 Relevant policies and how the Proposed Development supports their objectives are set out below.

National Planning Policy Framework (NPPF) (2021)

- 7.2.5 The NPPF (2021) states that significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development. The approach taken should allow each area to build on its strengths, counter any weaknesses and address the challenges of the future.
- 7.2.6 The NPPF also states that planning policies and decisions should recognise and address the specific locational requirements of different sectors. This includes making provision for clusters or networks of knowledge and data-driven, creative or high technology industries, and for storage and distribution operations at a variety of scales and in suitably accessible locations.
- 7.2.7 In the context of building a strong and competitive economy the NPPF states that planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt.
- 7.2.8 The Proposed Development will respond to national objectives by supporting the creation of high value employment opportunities and bolstering the industrial and manufacturing capacity which can attract additional investment.

Industrial Strategy: Building a Britain fit for the future (2017)

- 7.2.9 The areas where Britain is expected to become a global leader in driving innovation are set out in the Government's 2017 Industrial Strategy, which lays out a vision to drive productivity improvements across the UK. The Industrial Strategy identifies five Grand Challenges and sets out a delivery programme to make the UK a leader in four of these: artificial intelligence & big data, clean growth, future mobility, and catering for an ageing society. The Government explains that the move to cleaner economic growth is one of the greatest industrial opportunities of our time.
- 7.2.10 Two of these are directly related to the Proposed Development, with clean growth and future mobility being at the heart of the ambition and likely to play key roles in maximising the benefits and minimising the impacts of the Proposed Development.
- 7.2.11 This is Gravity Ltd have recognised the priority for an accelerated response to climate change and clean growth. Gravity has developed a Clean and Inclusive Growth Strategy that will set out, shape and drive a strategic response through the Local Development Order. An advanced manufacturing study has informed parameters for modern commercial buildings to shape the requirements for the Gravity site.
- 7.2.12 Recently the Government has developed its thinking and has prioritised transport decarbonisation. This includes a rapid response to the transition to electric vehicles (EV) which is opening up new market opportunities for large scale advanced manufacturing in the EV and battery production space.

Heart of the South West Local Industrial Strategy (2020)

- 7.2.13 The South West region has a number of globally competitive industrial assets and strengths, providing exciting high growth opportunities. The South West region is home to the first new nuclear power station in a generation (Hinkley Point C), as well as the largest naval base in Europe with unique nuclear defence capabilities. These assets offer opportunities linked to decommissioning, defence, and marine renewables, providing a multi-billion-pound clean energy opportunity which spans both the energy and engineering sectors and their supply chains.
- 7.2.14 However, even with these acknowledged strengths there are still significant disparities in productivity within the Local Economic Partnership (LEP) area and the Heart of the South West performs poorly on a number of productivity indicators, which directly impacts on

region's settlements. This is linked to low scores with respect to innovation indicators, relatively poor enterprise performance, wide disparity in social mobility, and sub-par performance for higher level skills attainment.

- 7.2.15 The Local Industrial Strategy (LIS) provides the opportunity to transform the economy through clean and inclusive growth, by developing a new approach to growth in urban, rural and peripheral areas. This will be achieved by decoupling economic growth from emissions growth, where the proceeds and benefits of economic growth are shared across communities. The Proposed Development's site designation as a Government approved Enterprise Zone (EZ) allows business rate retention, so that growth at this Site will generate business rates that can be retained and reinvested back into the local area. The EZ designation covers a period of 25 years from April 2017 until 2042. Therefore, it is a priority to create the conditions to enable and attract investment into the Site to capitalise on the unique commercial opportunities presented by the EZ. With no jobs or new floorspace yet established over the first four years, there is now a reduced window to realise benefits for the locality and community. The LDO is a simplified and streamlined form of planning which is ideally placed to respond to EZ sites and specifically large sites in single ownership.
- 7.2.16 The Heart of the South West LEP are partners alongside District and County Councils in the delivery of the Proposed Development. The Proposed Development has the capacity to provide significant employment and Gross Value Added¹ benefits to local and regional economies during the construction and operation (once fully built out and occupied) of the Proposed Development, and the realisation of the full suite of potential impacts will be facilitated through the adoption of the LDO. The LDO is aligned to the full extent of the boundary of the EZ and enables the whole site to be re-imagined to enable a strategic response which will create new high value employment opportunities in conjunction with climate action.
- 7.2.17 The Proposed Development responds to the economic strategy set out in the Heart of the South West LIS by seeking to attract businesses aligned to key business sectors identified in the LIS including:
- Low carbon energy production
 - Advanced manufacturing
 - Artificial intelligence and robotics
 - Electric vehicles
 - Data centres
 - Creative industries

Sedgemoor Local Plan 2011-32

- 7.2.18 The Sedgemoor Local Plan (2011-32) was adopted February 2019. It sets out how the district will grow and develop into the future. It includes the vision, priorities and policy framework for future development in the district, including addressing the requirements relating to housing, employment, retail and other facilities and infrastructure.
- 7.2.19 The Local Plan priority stated in paragraph 3.3 is "To ensure development in Sedgemoor supports the principles of sustainable development and delivers sustainable communities

¹ gross value added is the value generated by an individual producer, industry or sector engaged in the production of goods and services to an economy, sector or region. It is a way of measuring the economic contribution made to the economy.

whilst respecting the diversity in function and character of Sedgemoor's towns, villages and countryside."

- 7.2.20 Strategic Priority 5 sets out the plan's ambition to ensure economic wellbeing by addressing the low skill lever, qualifications deficit and low quality job opportunities. It recognises that despite employment growth this has been in low wage sectors and there is need to develop opportunities in higher value sectors and attract inward investment.
- 7.2.21 The Proposed Development is identified on policy maps as "Land Committed for Development" given planning consent was granted at the Site in November 2017 (42/13/00010).
- 7.2.22 The Major Infrastructure Projects policies within the Plan make reference to the Site. For the purposes of the Local Plan, Major Infrastructure Projects (MIPs) are defined as the infrastructure projects which would require Environmental Impact Assessments (EIA). Energy generation uses in particular at the Site are identified as potential MIPs.
- 7.2.23 Policy S1 Presumption in Favour of Sustainable Development states "When considering development proposals, the council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework"
- 7.2.24 Policy S2 sets out the spatial strategy for Sedgemoor and confirms that during the plan period (2011-2032), the Council will plan, monitor and manage the delivery of a minimum of 13,530 new homes (644 per annum) and 75 hectares of land for B1, B2 and B8 uses (business, general industrial and storage and distribution) to help meet the need for new homes, support the economy and create 9,795 new jobs.
- 7.2.25 Policy S3 Infrastructure Delivery states "New development will be required to provide and contribute towards the provision of services, facilities and infrastructure at a rate, scale and pace to meet the needs and requirements that are expected to arise from that development. All new development that generates a demand for infrastructure will only be permitted if the reasonable and necessary on and off-site infrastructure required to support and mitigate the impact of the development is provided."
- 7.2.26 Policy CO3 sets out the planning authority's approach to brownfield site development and is generally supportive of brownfield development. It states that "Generally the re-use or remodelling of such sites for employment uses will be supported but exceptionally where it can be demonstrated that such an approach is not viable or suitable, mixed-use schemes or residential only schemes may be considered."

Bridgwater Vision (2015)

- 7.2.27 The aim of the Vision was to develop a spatial vision for Bridgwater in order to bring about place transformation and to help create distinctiveness with a revitalised image and economic base. The first iteration of this Vision (2009) describes the Gravity site as one of the key character areas of focus to deliver the Vision. It explains that the Gravity site will be a significant employment area linked to a renewable, low carbon energy source. The Vision also explains that opportunities to incorporate other uses on the Site would also be explored.
- 7.2.28 The Vision was refreshed in 2015 to update on the successes delivered over the previous six years and to make adjustments where required. The refreshed vision explained that the then owner of the Site, BAE Systems, was considering ideas for potential energy uses, but that the Site could also provide a unique opportunity to support the services and industries related to a new generation of nuclear investment, possibly to accommodate foreign direct investment to supply components.
- 7.2.29 The Proposed Development responds to the Vision by supporting transformation of place at a scale which can revitalise the economic base. The Proposed Development will support

significant levels of employment in key growth sectors which will help to create a distinctive offer and attractive image for a new manufacturing hub in the South West.

Sedgemoor Economic Development Strategy

- 7.2.30 The Sedgemoor Economic Development Strategy 2015-2032 identifies Gravity as a key opportunity site to be implemented early in the Strategy period. The Site is identified as a key opportunity to address the economic challenges the District faces in terms of having a low-wage, low-skill economy.
- 7.2.31 The economic challenges need to be addressed in order for the District to transform its economy to support higher-skilled, higher-salary employment opportunities which allows its residents to live, work and play in proximity without having to commute out of the area for suitable employment opportunities.
- 7.2.32 The Proposed Development responds to the Strategy by delivering new manufacturing and commercial floorspace which will support high value jobs and develop and strengthen links to local and regional colleges and universities to improve skills development pipelines and pathways to employment.

Core Strategy 2011

- 7.2.33 The Sedgemoor Core Strategy was adopted in September 2011 and, although now superseded by the new Local Plan, included an allocation for an 'Energy Park' on the Gravity site (Policy P1 Bridgwater), with priority given to industrial uses including renewable or low carbon energy generation and other energy-related or complementary uses, including green technologies, supply components and support services. This allocation was based upon assumptions made at the time regarding the opportunity the Site presented, without any market interface, and identified approximately 90 hectares of developable employment land for a range and mix of employment uses.

7.3 Consultation

- 7.3.1 A section was included within the EIA Scoping Report (**Appendix 5.2**) submitted to SDC in July 2021 which identified that economics would be scoped into the EIA and provided an overview of the baseline economic context and proposed methodology.
- 7.3.2 As part of Gravity's programme of engagement, consultations have taken place with SDC to confirm the structure and approach of the chapter, discuss associated mitigation measures, and provide opportunity for further comment if required.
- 7.3.3 Public consultation has been conducted for the Proposed Development which has included establishing a project website, circulation of newsletters to stakeholders, articles in local papers and on social media platforms. Key issues raised by stakeholders are considered as part of this assessment and referred to in the relevant sections of this assessment.
- 7.3.4 The Scoping Opinion received from SDC (**Appendix 5.3**) confirmed that economic effects and receptors are to be scoped into the ES. The Economic Development Team has been consulted on the ES Scoping Report and has stated that Chapter 7 – Economics provides a comprehensive overview of the issues that will need to be considered as part of the ES.
- 7.3.5 The Scoping Opinion noted that the Proposed Development will significantly increase the volume of the development in comparison to the existing hybrid consent which is in place. Therefore, it would be desirable to provide an updated and more accurate estimate of the level of employment which could be created on site. This has been done through an analysis of the number of jobs in relation to the proposed floorspace.

- 7.3.6 The Scoping Opinion also highlights that it is the ambition of the Proposed Development to host new sectors on site, and that the assessment should consider how the new sectors would fit and enhance the existing business landscape and supply chain.

7.4 Methodology

- 7.4.1 All developments have the potential to generate economic effects at the local, regional and / or national level, principally in relation to changes in economic development, employment opportunities and additional spending power within local communities. Impacts are considered within the context of:

- Primary impacts: those which can be directly attributed to the proposed action - such as increased employment levels during the construction phase; and
- Secondary impacts: those which are indirect or induced changes - such as retail expenditure effects during the operational phase of the Proposed Development.

- 7.4.2 The range of likely significant economic effects generated by a development proposal depends upon the characteristics of the individual development combined with both the baseline economic conditions (e.g. labour market) which the development would be introduced to and identified committed developments which the development proposal would interact with.

- 7.4.3 As the Proposed Development is an ambitious proposal introducing new business land and infrastructure which will contribute to supporting economic growth at national, regional and local levels, the Proposed Development has the clear potential to generate a range of secondary economic effects. Specific types of likely effects have been assessed in relation to the relevant phase(s) of development and assessment scenario as detailed below.

- 7.4.4 Since the LDO is a market facing flexible consent in terms of actual land uses implemented, the Proposed Development has been assessed for a most likely outcome of the maximum development parameters set out within the description of development and Parameter Plans and comprises of the land uses and operations below:

- 1,000,000 sqm of Advanced Manufacturing floorspace;
- 65,000 sqm of supporting employment uses;
- 35,000 sqm of supporting and ancillary uses; and
- 750 residential units for employees at the Site.

Study Area

- 7.4.5 The following Study Areas have been adopted for this economic assessment:

- **Labour Market Study Area:** the M5 Corridor Functional Economic Market Area (FEMA). This area has been chosen to define the Labour Market Study Area as it takes account of Travel to Work Areas (TTWAs), housing market areas, and commercial property markets to best capture the mobility of labour across administrative boundaries. The geographic boundaries of the FEMA are consistent with the combined borders of Sedgemoor District Council and the Taunton Deane area². West Somerset which now forms part of Somerset West and Taunton District Council has not been included in the study area which focuses on the M5 north/south corridor.

² Somerset West and Taunton Council came into being on 1 April 2019 covering the administrative areas of the former Councils of West Somerset (WSC) and Taunton Deane.

The Labour Market Study Area has an estimated population of 243,218, a working age population of 141,992 and a higher jobs density of 0.91 (compared with the UK average of 0.87), however this ranges from 0.82 in Sedgemoor to 1.0 in Taunton Deane.

- **Housing Market Study Area:** Defined by the Sedgemoor District boundary, which is recognised as forming its own housing market area (HMA), although the M5 corridor means that there are some links to other districts such as West Somerset and Taunton the identification of a single HMA for each local authority supports the Study Area boundary of Sedgemoor.

7.4.6 The Labour Market Study Area and Housing Market Study Areas are presented in **Appendix 7.1 and 7.2** respectively.

Baseline Data Collection

7.4.7 This section provides an overview of the economic characteristics within the Site, the identified Study Area and highlights how these compare to other spatial areas, where relevant, including SDC, the South West Region and the United Kingdom.

7.4.8 The following economic indicators have been considered to establish the baseline conditions:

- Main demographic groups (children, working age, pensionable age)
- Economic activity rate
- Unemployment rate
- Wages
- Qualification attainment
- Employment by broad industrial sector (additional emphasis given to key business sectors identified at Scoping.)

7.4.9 The following sources of information have been used to develop the baseline economic conditions:

- Annual Population Survey (2020)
- Annual Survey of Hours and Earnings (2020)
- Business Register and Employment Survey (2019)
- Index of Multiple Deprivation (2019)
- Population Estimates (2019)
- Population Projections (2020)
- UK Business Counts (2020)

7.4.10 Relevant quantitative data was analysed to predict gross and net economic effects, including demographic changes, expenditure and employment generation, from the construction of the Proposed Development. This model applied economic multipliers and additionality assumptions as detailed in **Section 7.5**.

7.4.11 Discounting has been applied to the net gross value added (GVA) presented within this Chapter to determine the present value (2021) of GVA. This takes account of the current

understanding of the construction programme to up to the baseline year of 2032. It is however acknowledged that the capital expenditure and programme associated with the Proposed Development may be subject to change within the parameters of the LDO as it will be market led.

Sensitive Receptors

- 7.4.12 Based on the information sources outlined above, the current baseline conditions of the Site and surrounding area were characterised which has led to the identification of relevant sensitive receptors to consider within the assessment. Any potential receptor with no or negligible sensitivity to possible economic change(s) arising from the Proposed Development has no potential to experience likely significant effects (within the context of the EIA Regulations) and has therefore been excluded from this assessment. This ensures that the assessment remains proportionate and focuses on reporting likely significant economic effects from the Proposed Development.
- 7.4.13 For employment effects, the availability of labour and skills is critical in accommodating the demands, needs and requirements of the Proposed Development. The sensitivity of the labour market has been defined in relation to:
- The availability of skilled labour in the Labour Market Study Area, relative to regional and national averages;
 - The proportion of employment in relevant sectors (e.g. construction, manufacturing, scientific, professional and technical) within the Labour Market Study Area; and
 - The availability of labour (including the unemployed) within the Labour Market Study Area.

Assessment of Significance

- 7.4.14 There are no specific methodological guidelines or requirements for assessing economics within the context of EIA. However, the assessment of the likely significant economic effects associated with the Proposed Development has been undertaken in accordance with HM Treasury Green Book appraisal guidance.
- 7.4.15 The level and significance of likely economic effects has been judged with reference to the following factors:
- Sensitivity of affected receptor (e.g., construction, manufacturing, scientific, professional and technical sectors); and,
 - Predicted magnitude of change.
- 7.4.16 In overall terms, the sensitivity of the labour market within the Study Area has been defined in relation to:
- The availability of skilled labour relative to regional and national averages;
 - The proportion of employment in relevant sectors (e.g. construction);
 - The availability of labour (including the unemployed); and
 - Relevant education and training provision.
- 7.4.17 A labour market with plentiful capacity and/or high skills would be defined as low sensitivity, while a limited labour market and/or low skills capacity would be classified as a high sensitivity receptor. The sensitivity criteria which have been applied to the assessment are detailed in **Table 7.1** below.

Sensitivity	Example
High	There is a shortfall of appropriate labour and skills. The Proposed Development would therefore lead to labour market pressure and distortions (i.e., skills and capacity shortages, import of labour, wage inflation).
Medium	There is a low/limited supply of appropriate labour and skills. The Proposed Development may therefore lead to labour market pressure or distortions.
Low	There is a readily available supply of appropriate labour and skills. The Proposed Development is therefore unlikely to lead to labour market pressure or distortions.

Table 7.1 Labour Market Sensitivity Criteria

7.4.18 Magnitudes of change are also considered within the assessment, and consistent definitions have been adopted for economic effects, as set out in **Table 7.2** below.

Magnitude of Change	Type of Change	Criteria
High	Adverse	Employment changes: the number of jobs lost in the Study Area would be 250 or greater (based upon the EU definition of small and medium enterprises (European Commission, 2003)).
	Beneficial	Employment changes: the number of jobs created in the Study Area would be 250 or greater.
Medium	Adverse	Employment changes: the number of jobs lost in the Study Area would be 50 or greater, but fewer than 250.
	Beneficial	Employment changes: the number of jobs created in the Study Area would be 50 or greater, but fewer than 250.
Low	Adverse	Employment changes: the number of jobs lost in the Study Area would be greater than 10, but fewer than 50.
	Beneficial	Employment changes: the number of jobs created in the Study Area would be greater than 10, but fewer than 50.
Negligible	Adverse	Employment changes: the number of jobs lost in the Study Area would be less than 10.
	Beneficial	Employment changes: the number of jobs gained in the Study Area would be less than 10.
No Change		No change would be perceptible, either beneficial or adverse.

Table 7.2 Labour Market Sensitivity Criteria

7.4.19 The combination of receptor sensitivity and magnitude of change informs the assessment and attribution of significance. The levels of significance relate to the extent to which the impacts are felt. In the case of economic factors, the significance of impacts is defined by their relevance and influence on decision-making at different spatial scales.

7.4.20 An overview of the significance criteria is summarised in **Table 7.3** below.

	Level of Effect	Criteria
<i>Significant</i>	Substantial	These effects are assigned this level of significance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of national or regional importance.
	Major	These effects are likely to be important considerations at a district scale and may become key factors in the decision-making process.
	Moderate	These effects, while important at a local scale, are not anticipated to be key decision-making issues.
<i>Not significant</i>	Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process.
	Negligible or No Effect	These effects are imperceptible, or within normal bounds of variation, or in the margins of forecasting errors. Such effects should not be considered by the decision-maker.

Table 7.3 Significance Criteria

7.4.21 These thresholds may be adjusted by:

- Application of additional factors;
- Comparison with regulations or standards;
- Reference to criteria such as protected species, protected sites, landscapes;
- Consultation with consultees and decision makers;
- Compliance with policy (or plan) objectives;
- Comparison with experience on similar projects elsewhere; and
- Experience and professional judgement of the specialist assessor.

7.4.22 In line with standard EIA practice, a matrix-based approach was adopted to consider the sensitivity of identified receptors in tandem with the likely magnitude of change from the Proposed Development. This method allows the level and significance in EIA terms of all predicted economic effects to be determined. The EIA significance matrix adopted in this assessment is detailed in **Table 7.4** below.

Sensitivity	Magnitude of Change			
	High	Medium	Low	Negligible
High	Substantial	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor/Negligible	Negligible

Table 7.4 Significance Matrix of Economic Effects

7.4.23 In line with the methodology outlined above, moderate, major, or substantial likely effects are considered significant within the context of EIA Regulations.

7.4.24 Following the identification of likely economic effects, the need for further mitigation measures to address the predicted adverse effects have been considered.

7.4.25 The assessment concludes by reporting the level and significance of likely residual economic effects from the Proposed Development, taking account of all proposed mitigation measures, and considering the requirement for monitoring.

Limitations and Assumptions

7.4.26 The following limitations and assumptions have been adopted in this assessment:

COVID-19

- 7.4.27 The baseline conditions presented within this assessment utilise data collected prior to and during the global disruption as a result of the ongoing COVID-19 pandemic.
- 7.4.28 At the time of writing, COVID-19 has resulted in changes to socio-economic conditions, however the extent of the magnitude and temporal influence of these effects is not yet fully understood. Consequently, it may be the case that some impacts are not manifest in the current baseline data and will appear in the medium term. As a result, data has been presented up to 2019 to avoid any confusion or misinterpretation of trends associated with the impacts of COVID-19 on 2020 figures.
- 7.4.29 The additionality assumptions presented within this Chapter (see [Section 7.7](#)) have been adjusted to take account of the increased competition for contracts which may arise as an implication of the COVID-19 pandemic on the labour market. Baseline data presented remains representative and appropriate to inform a robust and proportionate assessment of the Proposed Development.

Labour Market Study Area

- 7.4.30 The Labour Market Study Area is consistent with the combined borders of Sedgemoor and the former Taunton Deane Council. This geography was identified as the M5 Corridor Functional Economic Market Area (FEMA) within the Somerset Housing Market Areas and Functional Economic Market Areas in Somerset report (2015).
- 7.4.31 It is acknowledged that the report is several years old and that there are many linkages between local and regional economies in the South West, however the M5 Corridor FEMA nonetheless provides robustly defined boundary which will aid the collection and analysis of statistical data.

Capital Expenditure

- 7.4.32 The capital expenditure to deliver the floorspace quantum set out in the Description of Development has been estimated using RICS Build Cost Information Service (BCIS).
- 7.4.33 BCIS data has been rebased to Q3 2021 values for Sedgemoor. The mean build cost per square meter for mixed commercial developments (£3081) and advanced factories/offices – mixed facilities (£1499) have been used as they best fit with the parameters of development described for the Site. In addition, 750 homes are to be delivered on site for use by employees of the Proposed Development. The England average home size of 67.7 sqm has been used, along with the mean build cost per square metre in Sedgemoor (£1,281), to estimate the capital expenditure required to deliver the housing units.
- 7.4.34 Consequently, the estimated capital expenditure to deliver the floorspace quanta is:
- 100,000 sqm commercial x BCIS cost per square meter for mixed commercial developments (£3081) = £308,100,000
 - 1,000,000 sqm advanced manufacturing x BCIS cost per square meter for advanced factories/offices – mixed facilities (£1499) = £1,499,000,000
 - 750 homes x average home size of 67.7 sqm x BCIS cost per square metre for housing = £65,043,000.

- 7.4.35 Therefore, the total estimated capital cost of the Proposed Development is £308,100,000 + £1,499,000,000 + £65,043,000 = £1,872,142,000.
- 7.4.36 No discount for scale of development has been applied to the cost estimates, as the floorspace quanta may come forward in a mix of unit sizes and specifications depending on what the market delivers.
- 7.4.37 The robustness of the calculations estimating the capital expenditure are limited by the level of specificity regarding the Proposed Development. It is understood that the Proposed Development will be market-led, and therefore the parameters set out in the Description of Development provide the basis for estimating total build cost. Options for modular and more efficient construction methods are being considered by potential occupiers and therefore costs and in turn labour required for construction may be reduced. costs and construction methods will be refined at such a time when there is more clarity on the preferred occupier, design and specification.

Worker productivity and Gross Value Added

- 7.4.38 Figures for Gross Value Added per head have been sourced from the Office for National Statistics Annual Business Survey. The most current available data is from 2017, and therefore these values have been uprated by the ONS GDP Deflator³ to bring them to 2021 prices.
- 7.4.39 The GVA per head for the various types of employment supported by the demolition / construction and operation phases of the Proposed Development are summarised in **Table 7.5** below.

	GVA per-employee	
	2017	2021
Construction	£60,664	£65,711
Manufacturing	£63,792	£69,099
Professional, scientific & technical	£55,688	£60,320
Services	£42,708	£46,261

Table 7.5 showing GVA per head

Construction Employment

- 7.4.40 The calculation of construction employment is calculated by taking the capital investment required to deliver the infrastructure and assets as set out in the Description of Development and dividing that figure by the amount of turnover within the construction industry required to support a single worker.
- 7.4.41 Data from the Annual Business Survey revealed that the level of turnover required to support one construction worker in the South West region was £151,953 in 2017. This has been adjusted by the ONS GDP Deflator to uprate the figure to 2021 values, resulting in a turnover of £164,595 to support one construction worker.
- 7.4.42 The estimates of construction employment are limited by the robustness of the build cost data. Current market data has been sourced from BCIS to estimate the capital expenditure; however this may be refined in the future when formal cost estimates have been obtained based on detailed designs and specifications for floorspace and the infrastructure for individual plots.

³ The GDP Deflator value to translate 2017 prices into 2021 prices is 1.083194909

Operational Employment

- 7.4.43 The calculation of operational employment is done by taking the total floorspace delivered within a given use classification (i.e. B8 – storage and distribution) and dividing the area by an employment density figure sourced from Employment Densities Guide (3rd edition). Where use classifications are not covered within the Employment Densities Guide (3rd edition), such as advanced manufacturing uses, custom figures have been derived using a combination of market research and previous project experience.
- 7.4.44 A summary of the employment densities used within the assessment is presented in **Table 7.6** below. **Table 7.6** provides a breakdown of the 1,000,000 sqm of advanced manufacturing space and a breakdown of the 100,000 sqm of supporting commercial floorspace.

Use	Floorspace (sqm)	Employment Density	Gross Jobs
Advanced Manufacturing			
Advanced manufacturing	1,000,000	164	6,100
Manufacturing Support Space			
R&D	35,000	60	585
Industrial Processes	7,500	47	160
Storage/Distribution	15,000	80	190
Other supporting uses	7,500	60	125
Total	65,000		1,060
Supporting & Ancillary uses			
Nursery	1,000	6	55
Hotel/conference centre	8,500	3*	65
Sports/leisure centre	8,000	n/a	50**
Gym	7,500		
Retail/café	750	15	50
Health Centre	750	33	25
37 Club***	2,500	n/a	0
Various other	6,000	60	100
Total	35,000		345
Grand Total	1,100,000		7,505

*Hotel employment density is the number of beds per worker

**The Employment Density Guide recommends 40-50 employees per gym. Assumed to be managed/operated as a single facility with the sport/leisure facilities with upper estimate used.

***existing facility with not net increase in employees anticipated

Table 7.6 Operational Employment Density Assumptions

Net Employment

- 7.4.45 To assess the scale of net additional jobs likely to be generated or supported by the Proposed Development, additional factors based on the characteristics of the Labour Market Study Area were applied to predicted gross employment. Appropriate economic appraisal guidance⁴ and professional judgment based on similar economic impact assessments have been used to estimate values for:

- **Deadweight:** what would happen in the absence of the Proposed Development;
- **Leakage:** the proportion of employment opportunities accessed by people living outside the Study Area;

⁴ HM Treasury's Green Book appraisal guidance

- **Displacement:** the proportion of Proposed Development benefit accounted for by a reduction in benefit elsewhere;
- **Multipliers:** to estimate further economic activity associated with additional income and supplier purchases.

7.4.46 The additionality factors adopted in this assessment are detailed in **Section 7.8 Assessment of Likely Effects** under the appropriate subheadings.

Assessment

7.4.47 The assessment scenario presented in this Chapter is based on the 2032 Baseline. The current state of the environment is provided as context.

Current State of the Environment (2021)

7.4.48 Baseline conditions are presented for the current state of the environment in 2021, which includes part implementation of the 2017 Planning Consent (i.e. Gravity Link Road, Site remediation completed and associated ecological enhancements).

2032 Baseline

7.4.49 The year 2032 has been identified as the assessment year for operational effects for Economics Assessment. This year has been identified as it is the end of the current Local Plan period and a date by which it is reasonable to assume that the development approved by the LDO will have been delivered.

7.4.50 The assessment of likely significant economic effects has taken account of the influence of approved developments (or those considered likely to have been approved and implemented by 2032) developments likely to generate economic effects which may interact with the Proposed Development. This assessment includes estimating employment generation and the economic value added to the local economy in terms of GVA.

7.4.51 The 2032 Assessment factors in committed developments that were identified as having the potential to give rise to significant cumulative effects. The assessment of likely significant cumulative effects with these developments is inherent to the assessment and is not reported separately.

7.5 Baseline Conditions

7.5.1 This section identifies the pertinent aspects of current economic baseline conditions of relevance to this assessment and considers how these conditions may evolve in the absence of the Proposed Development. The sensitivity of receptors to potential economic effects are identified in **Table 7.1** and used within the impact assessment presented in **Section 7.8**.

Current State of the Environment (2021)

Site and Surroundings

7.5.2 Sedgemoor is a part of the Heart of the South West Local Enterprise Partnership (LEP) which covers 16 local authority areas across Somerset and Devon. The LEP is home to some 1.8 million people, 72,000 enterprises, and boasts four universities and ten further education colleges.

7.5.3 The Site is located within the M5 corridor which is recognised as presenting significant economic potential for the district. The M5, associated A roads and the mainline railway allow access to international airports at Bristol and Exeter and the Site is within 90 minutes of the

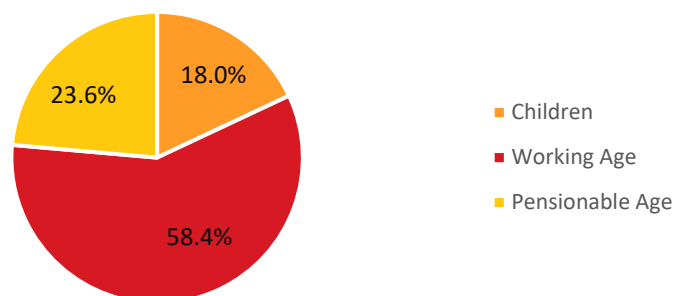
rapidly expanding economies of Bristol and Exeter, which provide opportunities to capture spill out activities and graduates and apprentices from these cities.

- 7.5.4 The Proposed Development will be created on the Site of the Former Royal Ordnance Factory (ROF) to the north of Bridgwater. It is noted that the ROF was a key employer in the local area for around 60 years employing more than 1,000 people during its peak activity periods. It finally closed in 2008 in parallel to a number of other industrial closures on other sites in Bridgwater.
- 7.5.5 The Site lies immediately to the north of the villages of Puriton and Woolavington, where there are existing businesses providing day to day convenience goods for local residents. A post office is also located on Middle Street within the centre of Puriton. Bridgwater, the principal service centre within Sedgemoor, lies approximately 6km to the south and provides additional services and employment associated with a larger town.
- 7.5.6 The Proposed Development, as an Enterprise Zone and smart campus, aims to attract higher value occupiers to create new opportunities for local residents and businesses as well as addressing national challenges relating to clean and inclusive growth.
- 7.5.7 **Appendices 1.1** and **1.2** show the Site location and LDO boundary respectively.

Demographics

- 7.5.8 Data from the Office for National Statistics (ONS) shows that the population within the Labour Market Study Area was estimated at 243,220 in 2019. The total population of the Study Area grew faster compared to the Sedgemoor Local Authority area alone, increasing by 8.7% across the Labour Market Study Area between 2010 and 2019 versus 8.3% for Sedgemoor alone.
- 7.5.9 The distribution of the population within Labour Market Study Area between the three primary categories (children, working age, and pensionable age) is summarised in **Figure 7-1** below.

Figure 7-1 Population Distribution (2019)



- 7.5.10 The distribution of population among the main age groups in the Labour Market Study Area is broadly similar to what is observed in the South West region, however the Labour Market Study Area is more top heavy, i.e. there is a greater proportion of people of pensionable age, when compared to the national average.
- 7.5.11 What is not revealed from the population data is the influence of migration in to / out of the Labour Market Study Area. It is acknowledged that not all labour will be sourced from within the Labour Market Study Area, and therefore additional context is provided which aligns with the assumptions made within **Chapter 9 Transport and Access** that additional labour will come from a 90-minute drive time of the Proposed Development. In this wider area there are an estimated 2,163,300 residents, distributed across the main age groups in similar

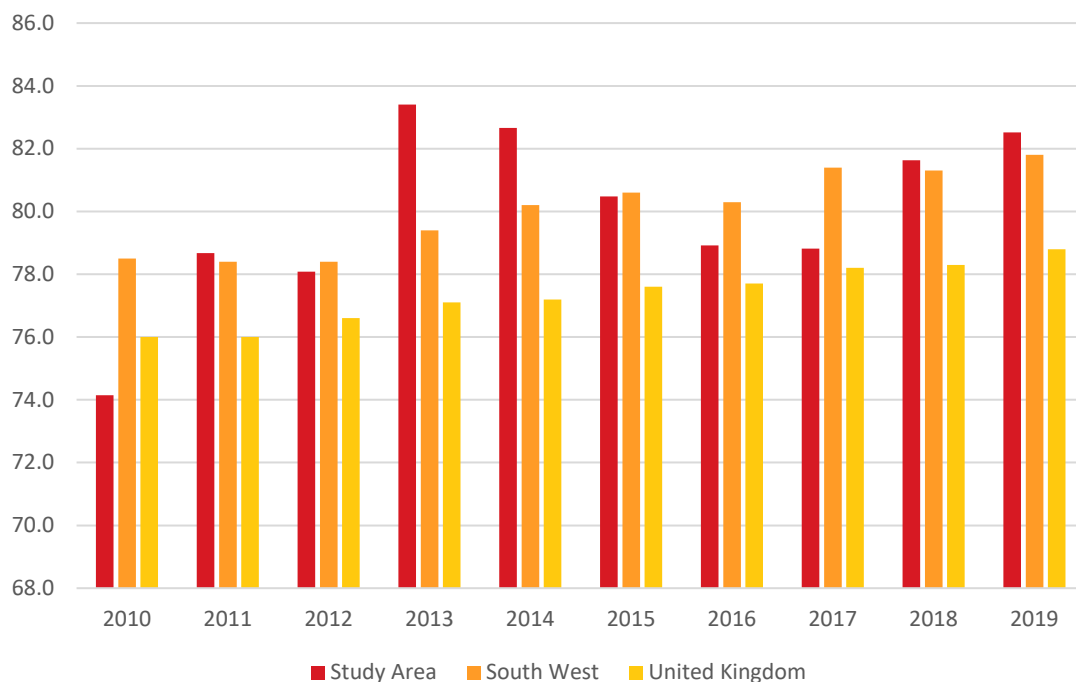
proportions Providing a significant pool of labour from which the Proposed Development can draw on.

- 7.5.12 The Proposed Development will help to retain and attract people of working age into the Labour Market Study Area to take up new employment opportunities. This may help to balance the population distribution and slow the trend of an increasingly ageing workforce by attracting younger people as well as reduce current levels of out commuting.

Economic Activity

- 7.5.13 Economic activity measures whether or not a person is an active participant in the labour market and includes those unemployed but who are actively seeking work. Data from the Annual Population Survey (APS) indicates that the economic activity rate within the Study Area was 82.5% in 2019. This is reflective of the rate across the entire South West region (81.8%), and above what is observed at the national scale (78.8%)⁵. The economic activity rate at three different spatial levels is presented in **Figure 7-2** to provide context and comparison between the Study Area, the wider South West, and the national levels.

Figure 7-2 Economic Activity Rate (%)



- 7.5.14 The economic activity rate in the Study Area has been above the national rate over the past decade in all but a single year (2010). The economic activity rate is a measure of an economy's active workforce and labour supply. Strong rates in the Study Area when combined with low unemployment signals that the labour market has limited capacity in proportion to its population when compared to the national average.
- 7.5.15 In the wider context, aligned with the 90-minute drive time assumption adopted within **Chapter 9 Transport and Access**, ONS data shows that the economic activity rate is 82.2%. This is very closely aligned with what is observed within the Study Area.

⁵ Office for National Statistics. Annual Population Survey

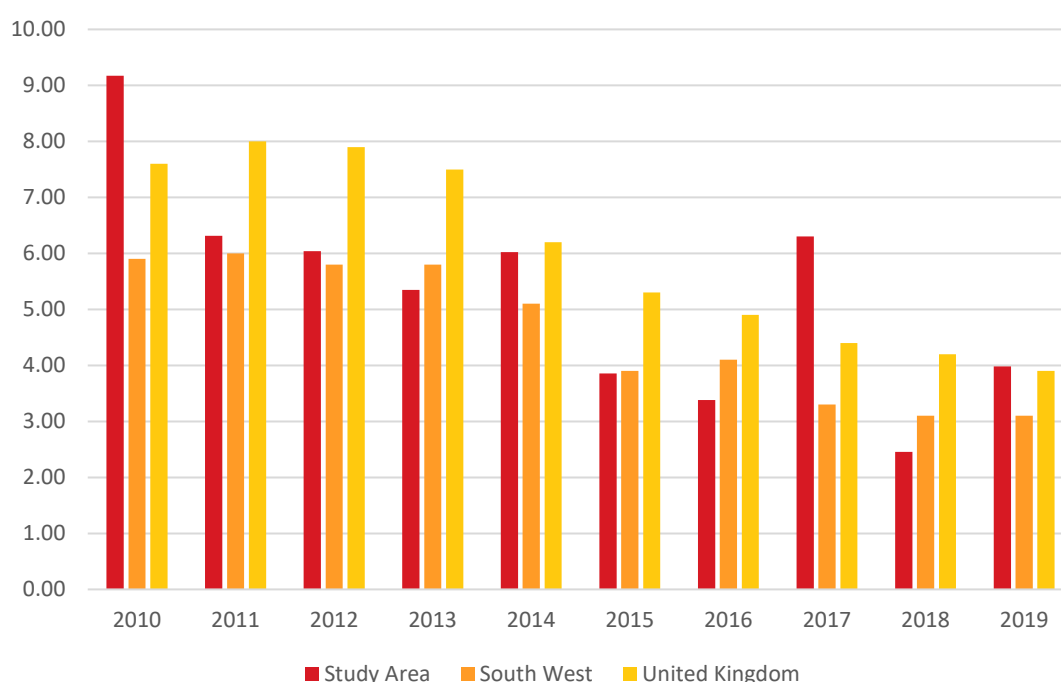
- 7.5.16 The development of the Gravity site will present an opportunity to further engage the labour market within the Study Area, and indeed to surrounding locales, supporting new high value employment opportunities.

Unemployment

- 7.5.17 The unemployment rate across the Study Area was 4.0% in 2019, a slight increase over the 2.5% reported in 2018. This rate is above that which was observed in the South West (3.1%) region and also above the national average for the UK (3.9%)⁶.

- 7.5.18 The unemployment rate was relatively high at all spatial levels in the years following the Financial Crisis circa 2008. The unemployment rate at local, regional, and national spatial levels is presented in **Figure 7-3** below.

Figure 7-3 Unemployment Rate (%)



- 7.5.19 The overall trend of the unemployment rate in the Study Area has been gradually decreasing. This could relate to a range of factors including a strengthening labour market which is providing employment opportunities through large scale projects such as Hinkley Point C that are being taken up by residents within the Study Area, but also due to demographic factors such as an ageing population taking people out of the labour market.

- 7.5.20 In the wider context the unemployment rate is 3.6% which is similar to what is observed within the Study Area. However, it should be noted that a couple of data point were missing or suppressed within the Annual Population Survey and therefore the 3.6% is indicative of rate in the wider region, but not exact.

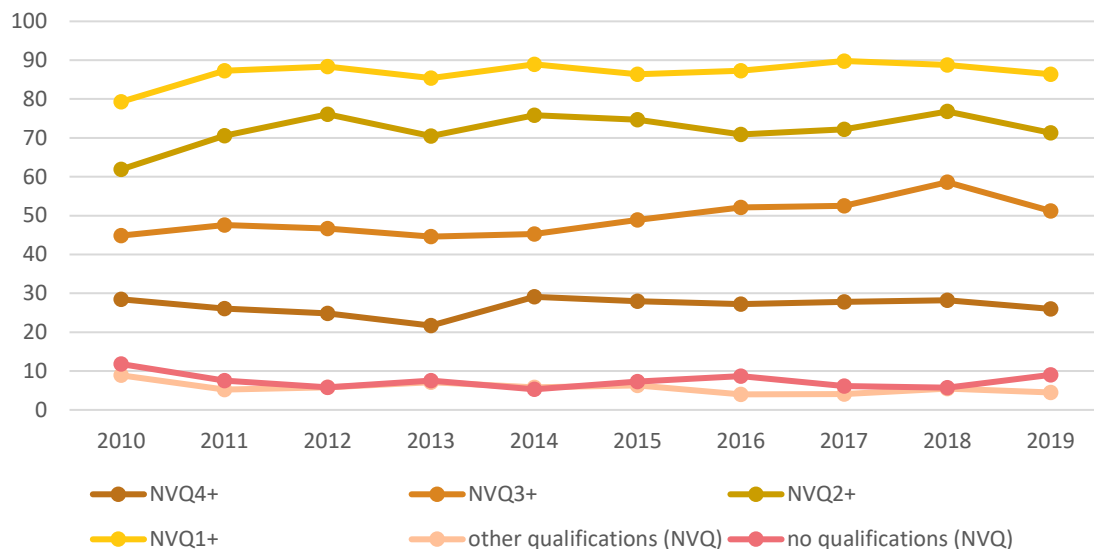
- 7.5.21 The Proposed Development will support both short and long-term employment opportunities, some of which are anticipated to be taken up by people presently unemployed but looking for work. This will reduce the overall level of unemployment and further engage the labour market within the Study Area.

⁶ Office for National Statistics. Annual Population Survey

Skills Profile

- 7.5.22 Qualification attainment is an indicator of the levels of skilled labour within an area, with greater proportions of highly qualified workers correlated with greater availability of high-value and well-paid jobs.
- 7.5.23 Within the labour market Study Area, the working age population shows less than 32% are qualified to NVQ4+ as indicated by 2019 APS data⁷. The overall profile of qualification attainment in the Study Area is presented in **Figure 7-4** below.

Figure 7-4 Qualifications Attainment, Study Area (%)



- 7.5.24 The rates of high-level qualifications attainment, NVQ4+, within the Study Area (31.9%) and South West region (39.2%) is behind the UK population (40.2%) showing lower qualification attainment than the wider region. The distribution of skills in the labour force within the Study Area suggests that there is not a high concentration of high-skilled jobs, whereas other locations in the South West have established manufacturing clusters which support a range of high skilled employment which is better remunerated.
- 7.5.25 In the wider spatial context, the skills profile within the workforce shows higher rates of NVQ4+ attainment (41.3%) than the Study Area and is more similar to the skills profile observed across the South West region. This indicates that there is a high degree of skills within the wider labour force which may be drawn upon.
- 7.5.26 The Proposed Development will support the development of a new advanced manufacturing cluster which will create a focal point for high-value and highly skilled employment opportunities. This will help to retain and attract skilled workers into the area and strengthen linkages to local and regional further and higher education institutions to increase the skills profile of the labour force and raise qualification attainment rates, which can be directly linked to employment opportunities at Gravity. The Gravity Skills Charter will also support local people finding opportunities within the Site.
- 7.5.27 Bridgwater and Taunton College have been supporting occupier enquiries to respond to their workforce development needs and has agreed to provide a strategic role to liaise with and coordinate with other partners to find solutions to meet business requirements. The provision of a dedicated training facility and bespoke programmes may well be required if transformational objectives are to be achieved and local labour is optimised. As such

⁷ Annual Population Survey. Office for National Statistics

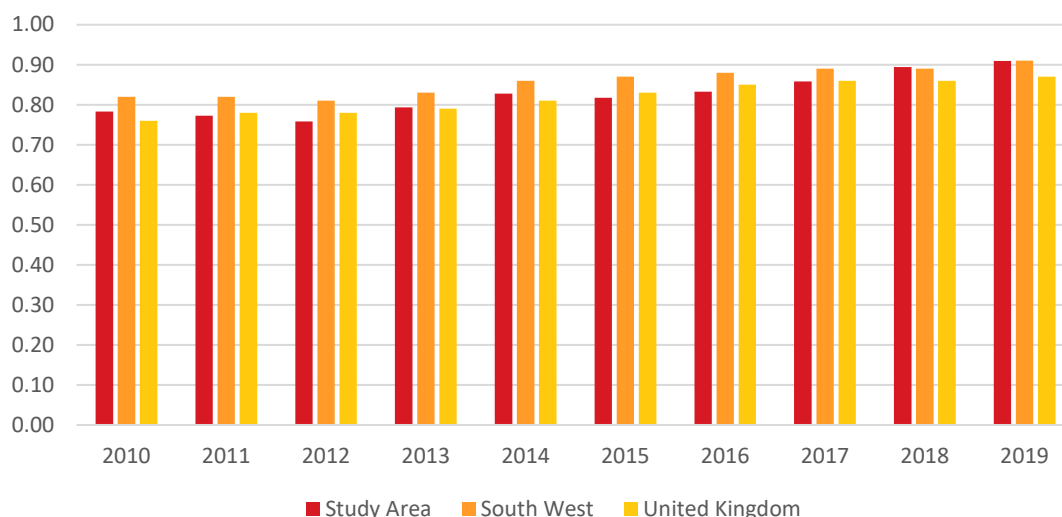
investment in skills and training is an important part of the investment plan and may need a fast-track response early in the programme to avoid a skills or labour force gap.

- 7.5.28 The existing Somerset Energy Innovation Centre constructed to support the HPC project could also be repurposed to support supply chain development, subject to agreeing terms with the County Council as landlord. The skills need of the supply chain therefore is also relevant but may be more indirect.

Job Density

- 7.5.29 Job density is a measure of the number of jobs relative to the working age population. The jobs density within the Study Area was 0.91 in 2019, meaning that for every 100 people of working age in the Study Area, there were 91 jobs available⁸. This figure aligns with the jobs density of the entire South West region and is slightly above the national rate (0.87). The jobs density for the Study Area, South West and UK is presented in **Figure 7-5** below.

Figure 7-5 Job Density



- 7.5.30 There is little variation in the jobs density between each of the spatial areas, indicating that there are proportionally similar numbers of job opportunities for the working age populations across each spatial area. It is important to state that this does not mean that employment activity is largely contained within the local labour force – there will be in-commuting and out-commuting of workers as they seek employment which matches their personal skill profile and interests.
- 7.5.31 The Proposed Development will support a substantial number of new employment opportunities for residents of the Study Area, as well as nearby locales. This will increase the jobs density, meaning there will be more employment opportunities for each person of working age. This may reduce instances of out-commuting from the Study Area, whereby residents travel outside of the Study Area's boundaries for work. The high-quality employment opportunities at Gravity will help to retain and attract diverse and skilled workers, stimulating additional economic activity within the Study Area.

Earnings

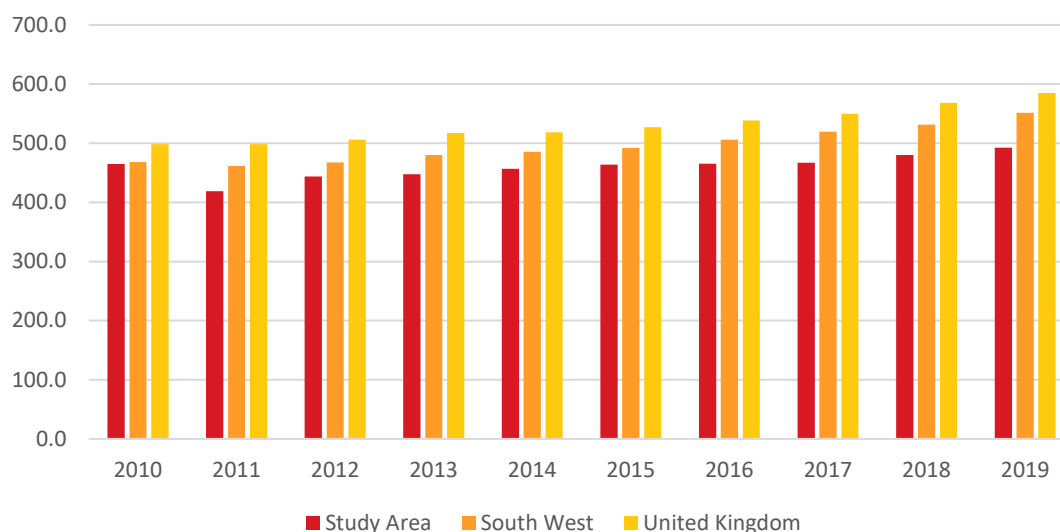
- 7.5.32 The gross median weekly wage for employees working within the Study Area were reported at £492.3⁹ in 2019, which was some 10.8% below the median wages in the South West and

⁸ Jobs Density. Office for National Statistics

⁹ Annual Survey of Hours and Earnings. Office for National Statistics

15.9% below the UK wide average. The trend in gross median weekly wages across the past decade is shown in **Figure 7-6** below.

Figure 7-6 Gross Median Weekly Wages



- 7.5.33 Lower wages in the Study Area compared with the South West and wider UK is indicative of the area's characteristics. The profile of the Study Area is predominantly rural in nature, with no major urban centre supporting significant concentrations of high-value employment. Pockets of skilled labour and high value employment exist, however employment clustered sectors such as services (particularly related to the visitor economy) and the public sector, which traditionally do not have the highest wages. This is also reflected in the lower proportion of highly qualified (NVQ4+) compared to the national and regional figures.
- 7.5.34 The advanced manufacturing and commercial floorspace delivered at Gravity will create a step change and move towards higher value opportunities within the local economy providing full and part time opportunities for higher paid jobs, apprenticeships and re-skilling. Advanced manufacturing industries are understood to pay premium wages compared with the manufacturing sector as a whole, and furthermore there is also stronger growth in wages within advanced manufacturing. The premium in average wages for those employed in advanced manufacturing has been estimated at 13% above the wider manufacturing sector¹⁰.

Industrial Profile

- 7.5.35 To contextualise the Proposed Development and understand the implications its delivery may have, it is important to understand the profile of employment within the Study Area labour market. The BRES indicates that there were some 112,000 jobs within the Study Area in 2019, of which slightly less than half (52,000) were in SDC¹¹. The industrial sectors supporting the greatest levels of employment were:
- Health (17.0%)
 - Retail (10.7%)
 - Manufacturing (9.4%)

¹⁰ UK Commission for Employment and Skills (2015). Sector Insights: skills and performance challenges in the advanced manufacturing sector. Available: [150626_AM_SLMi_report.pdf \(publishing.service.gov.uk\)](#)

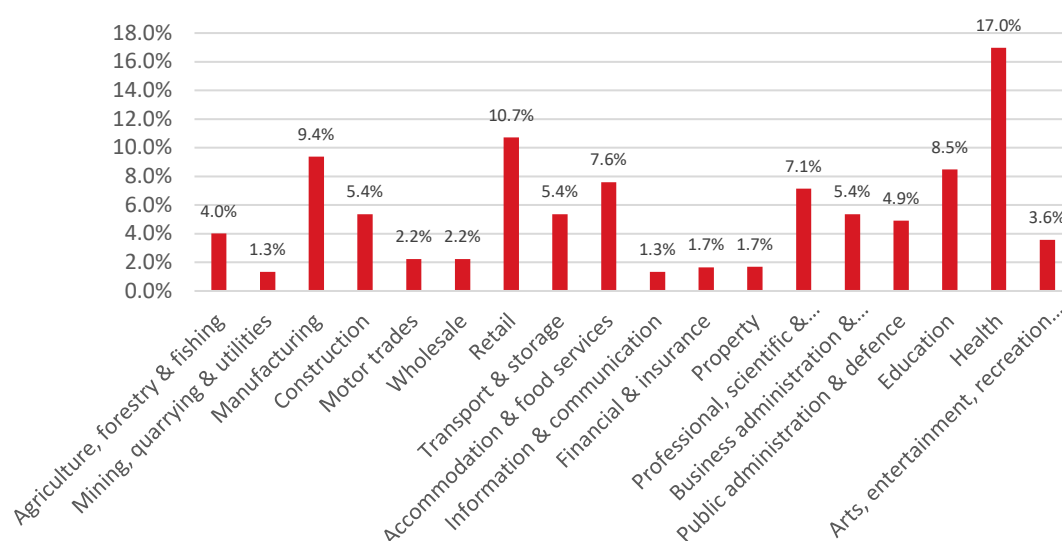
¹¹ Business Register and Employment Survey. Office for National Statistics

- Education (8.5%)
- Accommodation & Food Services (7.6%)

7.5.36 These five sectors account for over half (53.1%) of the total employment within the Labour Market Study Area. The high proportion of jobs in Health and Education signal the importance of public sector institutions as sources of employment, while the presence of Retail and Accommodation & Food sectors illustrate the significance of basic services and the visitor economy. The inclusion of manufacturing within the top five sectors of employment highlights the area's heritage and strengths in fabrication and production and suggests that the area is well positioned to grow this base and support growth in this sector.

7.5.37 The distribution of employment across the main industrial sectors is shown in **Figure 7-7** below.

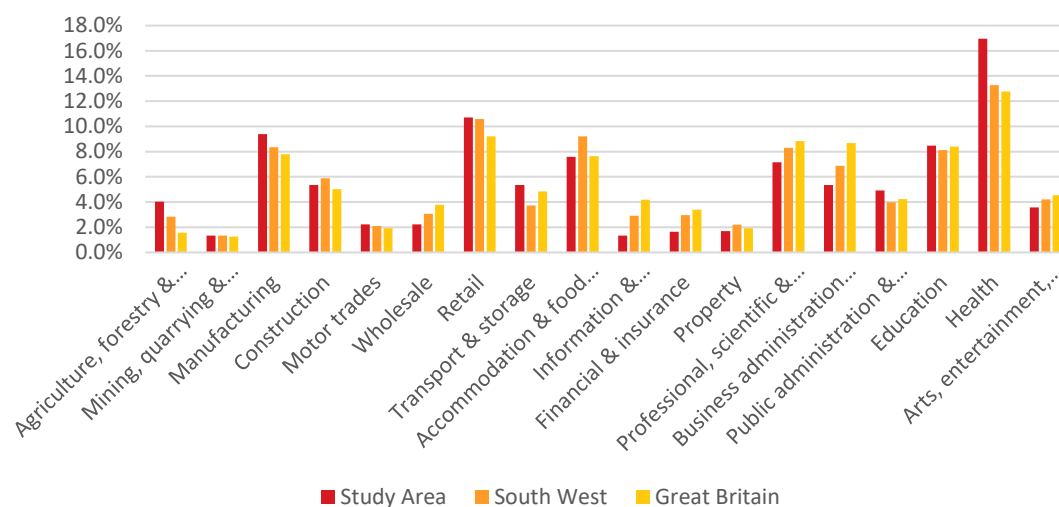
Figure 7-7 Employment by sector, 2019 (Study Area)



7.5.38 The main sectors of employment within the Study Area are aligned with those of the South West region, where Health, Retail, Food & Beverage Services, and Manufacturing sectors are within the top five. The lone difference between the Study Area and South West region is between Education and Professional, Scientific, & Technical employment.

7.5.39 Across Great Britain (BRES does not contain data for Northern Ireland), the main sectors of employment are similar to those observed at the South West region spatial level. The proportion of employment within the broad industrial sectors across the Study Area, South West, and national levels is presented in **Figure 7-8** below.

Figure 7-8 Employment by sector, 2019



- 7.5.40 Proportionally, the five sectors supporting the greatest levels of employment at each spatial scale account for between 47%-54% of total employment, highlighting the reliance on a handful of sectors for the majority of employment opportunities.
- 7.5.41 The data shows that there are clear similarities in the distribution of employment across the main industrial sectors at each spatial level which suggests that local, regional and national labour markets respond in similar fashions to broad economic trends.
- 7.5.42 Within the wider labour market, the largest sectors of employment are Health (13.4%), Retail (9.7%), Professional, scientific & technical (9.5%), Education (8.8%), and Accommodation & Food Services (7.7%). While not within the top five, manufacturing accounts for 7.3% of employment with approximately 80,500 people employed in the sector. This demonstrates that there is a sizable contingent of manufacturing labour within the wider area to draw upon.
- 7.5.43 The Proposed Development will build on the heritage and strength of the manufacturing sector opportunities within the Study Area. This aligns with several local and regional economic development policies and objectives (see **Chapter 6**). The advanced manufacturing element will need to be supported by a range of other goods and services providers, which will strengthen existing supply chains as well as create new ones. This will have a ripple effect whereby additional employment opportunity across a number of sectors will be supported by the increased economic activity linked with the Proposed Development.

Key Business Sectors

- 7.5.44 A brief overview of the key business sectors identified within the Scoping Report is provided below to highlight the sectors within the context of the wider labour market. Examination of the key sectors individually will enable a more thorough understanding of the anticipated impacts resulting from the Proposed Development.

Construction

- 7.5.45 BRES data identifies that the construction sector within the Labour Market Study Area has 6,000 employees as of 2019¹². This equates to 5.4% of the total workforce within the Labour Market Study Area. For comparison, the proportion of total employment involved in construction in South West region is 5.9%, and the national figure stands at 5.0% in the same year.

¹² Office for National Statistics. Business Register and Employment Survey (2019)

- 7.5.46 The significant level of capital expenditure which is estimated to deliver the quantum of floorspace delivered in the Description of Development (c. £1.872 billion) will support a substantial level of construction employment within the Labour Market Study Area. The impacts of this level of construction activity are assessed in **Section 7.8 Assessment of Likely Effects**. It is noted that the construction workforce within the Study Area will be heavily influenced by construction of Hinkley Point C (HPC) which EDF Energy estimate will peak at up to 8,500 workers. It is anticipated that as construction activity winds down on HPC in the run up to 2026 there will be opportunity for continuity of construction employment as Gravity construction ramps up capturing a large proportion of those workers.

Manufacturing

- 7.5.47 ONS data from the BRES reveals that 10,500 people were engaged in manufacturing within the Labour Market Study Area in 2019, accounting for 9.4% of total employment within the Study Area¹³. This places it as the 3rd largest sector of employment, behind Health (17%) and Retail (10.7%). To put in a wider context, manufacturing accounts for a proportionally larger share of employment within the Labour Market Study Area than it does across the wider South West (8.3%) and nationally (7.8%) in the same year.
- 7.5.48 The 1,000,000 sqm of advanced manufacturing floorspace to be delivered at Gravity, as set out in the Description of Development, will support a substantial level of new manufacturing sector employment within the Labour Market Study Area. The economic impacts of the increased capacity within the manufacturing sector are assessed in **Section 7.8 Assessment of Likely Effects**.

Professional, scientific & technical

- 7.5.49 Professional, scientific and technical employment supports 8,000 jobs, which equates to 7.1% of the total employment within the Labour Market Study Area as per 2019 BRES data¹⁴. This sector accounts for proportionally less employment at the Labour Market Study Area level when compared to the South West (8.3%) and nationally (8.8%) in the same year.
- 7.5.50 The 100,000 sqm of commercial floorspace coming forward on the Gravity site, as specified by the Description of Development, will support a substantial level of professional, technical, and scientific employment within the Labour Market Study Area. The economic impacts of this operational employment within the professional, scientific & technical sector is assessed in **Section 7.8 Assessment of Likely Effects**.

Services

- 7.5.51 The services sector, defined as the combination of the retail and accommodation, food & drink sectors, supports 20,500 jobs with the Labour Market Study Area as identified by 2019 ONS data¹⁵. The services sector is the single largest sector of employment within the Labour Market Study Area, accounting for 18.3% of total employment. The proportion of employment in the services sector within the Labour Market Study Area is between that observed at the South West and national spatial levels, 19.8% and 16.7% respectively.
- 7.5.52 The delivery of the Proposed Development will result in increased economic activity within the Labour Market Study Area. In the short term, the construction activity will bring an increase of construction labour into the Labour Market Study Area who will spend wages at local shops, restaurants, and entertainment and leisure facilities. In the long term, the operational employment within the Proposed Development will bring increased levels of spend within the Labour Market Study Area in local, regional and national supply chains. The economic impacts of the short and long term employment related to the Proposed Development on the

¹³ Office for National Statistics. Business Register and Employment Survey (2019)

¹⁴ Office for National Statistics. Business Register and Employment Survey (2019)

¹⁵ Office for National Statistics. Business Register and Employment Survey (2019)

services sector within the Labour Market Study Area is assessed in **Section 7.8 Assessment of Likely Effects**.

Housing Market Characteristics

- 7.5.53 Strategic Housing Market Assessment (SHMA) for Sedgemoor identifies an objectively assessed need (OAN) of 644 dwellings per annum (pa) for the period up to 2032 which aligns to both the Local Plan period and the 2032 baseline for the Proposed Development. This is aligned to delivering a requirement of 13,530 homes during the period from 2011 up to 2032.
- 7.5.54 The five-year housing land supply statement dated April 2020 notes that in terms of completions over the plan period there is a cumulative deficit of 194 units (5,602 units between 2011-2020). This does not necessarily mean that there will still be a deficit by 2032 as completions fluctuate and will depend on the number and size of sites coming on stream each year, however it shows that there is a deficit as of 2020.
- 7.5.55 The housing approach adopted by Sedgemoor, which has flowed through into the Local Plan from the previous plan is that the housing requirement for the area is derived from a jobs-led approach, targeting new jobs in the local area and improving self-containment (i.e. reducing outward commuting by residents) with the bulk of the housing provision is focused on Bridgwater, approximately 6km to the south of the Site. The Proposed Development aligns to this strategy, seeking to create new, higher value employment within the HMA and increasing self-containment through employment opportunities for local residents.
- 7.5.56 Housing price statistics from the ONS show that Sedgemoor has below average house prices, making it more affordable than other districts within Somerset¹⁶. However, low average wages mean that home ownership remains challenging despite a lower average house price. The Local Plan notes that a considerable number of affordable homes have been built since 2006, but the need remains high. There is a particular need identified for starter homes for young people.
- 7.5.57 HPC has also been successful in driving up accommodation capacity in the Study Area. The workforce and associated accommodation demand from HPC will reduce as construction winds down to completion in 2026.
- 7.5.58 The Proposed Development seeks to support the housing market through creation of higher value jobs, which are accessible to local people and seeks to improve self-containment and reduce the drain of younger people leaving the district, as well as reducing the current levels of out-commuting. Recognising the pressures on the local housing market provision has been made within the Proposed Development for suitable housing to support the construction phase and new operational employees, particularly young people who have chosen to remain in the local area offering the opportunity for not only employment, but also a home.

2032 Baseline

- 7.5.59 This section utilises current conditions at the Site and in the surrounding area (as discussed above), to forward predict likely conditions at the Site in 2032. This will enable the effects of the Proposed Development to be considered against a 'Do Nothing' (Future Baseline) assessment.
- 7.5.60 Within this assessment it is assumed that employment levels, sector splits, qualification attainment and economic activity rate will be broadly similar to their current levels, adjusted proportionally to reflect the increase in population and ageing profile. It is acknowledged that Hinkley Point C is a major infrastructure project within the South West in proximity to the Proposed Development and will contribute to the skills and employment trends anticipated up to 2032. HPC has a large number of workers living locally. It has been reported by EDF

¹⁶ Office for National Statistics. House price statistics for small areas and England and Wales.

Energy that the construction workforce is likely to peak at up to 8,500 workers in comparison to the 5,400 originally anticipated. This is a significant construction workforce from which to draw on as it de-mobilises. It is assumed that the upskilling and training programmes related to HPC will continue to improve the skills base and qualification attainment within the construction labour market in the South West. The HPC project is scheduled to complete in 2026 and a portion of that skilled construction workforce will become available to work on other projects, including the Proposed Development. This will provide continuity of employment for those that have a base in the area and wish to remain and contribute to the local economy. This enables the locality to retain and retrain the workforce and not lose working age population to other regions of the UK.

7.5.61 It has been assumed that consented development within the Local Plan will be delivered under the 2032 Baseline scenario. The following projects have been included within the 2032 baseline:

- The implemented 2017 Planning Consent totalling 177,059 of employment floorspace. As described in the Huntspill Energy Park (HEP) ES from the 2013, this floorspace is broken down into different uses:
 - 21,433 sqm of B1a/B1b, Research & Development and other office use not within Class A2
 - 10,716 sqm of B1c, light industrial uses
 - 43,600 sqm of B2, industrial process uses
 - 101,310 sqm of B8, storage and distribution uses
- The approved village enhancement scheme. This was identified as mitigation for the 2017 Planning Consent and is anticipated to be implemented in Spring 2022. The village enhancement scheme will deliver traffic calming enhancements within the villages of Puriton and Woolavington.
- Landscaping associated with the Gravity Link Road, anticipated to be implemented in Autumn 2021.
- Existing and approved development in the surrounding area, including development which have been allocated in the Local Plan 2011-2032. These include:
 - 42/20/00014 – Outline application with some matters reserved for the erection of 120 dwellings with public open space, structural planting and landscaping, surface water floor mitigation and attenuation, and vehicular access point from Woolavington Road (all matters reserved except access)
 - 54/19/00008 – Hybrid (full and outline) application. Full application for the erection of 100 dwellings including 30 affordable homes and associated infrastructure. Outline application with some matters reserved for the erection of up to 75 dwellings and associated infrastructure
 - 54/20/00009 – Resubmission of 54/18/00008 while at appeal. Outline planning application for the erection of up to 125 dwellings with public open space, landscaping, sustainable drainage system (SuDS), formation of vehicular access and offsite improvements to A39/B3141 Woolavington Hill Junction
 - 54/20/00010 – Resubmission of 54/19/00011 while at appeal. Outline application with some matters reserved, for the demolition of stable buildings and the erection of up to 95 dwellings with public open space, landscaping, and sustainable drainage systems (SuDS), vehicular access point from Woolavington Road and the erection of a double garage with associated access at Westfield Farm

- 7.5.62 Establishing the quantum of development within the 2032 baseline scenario enables assessment of likely significant effects on economic receptors in combination with the predicted baseline in 2032.
- 7.5.63 In terms of demographic and economic data, population projections are statistical measures currently available to consider within the 2032 Baseline scenario.
- 7.5.64 The ONS projections suggest that the population within the Labour Market Study Area is anticipated to grow by 8.9% between 2020 and 2032. This growth is projected to be driven by substantial increases to the population of pensionable age persons, (+32%) and the population of working age people (+3.1%), while the overall population of children within the Labour Market Study Area is anticipated to decline (-3.2%).
- 7.5.65 The anticipated population distribution in 2032 is shown below in **Figure 7-9**.

Figure 7-9 Population Distribution (2032)



Hinkley Point C

- 7.5.66 The EDF website confirms that the final investment decision and the start of construction at HPC took place in the second half of 2016. Current estimates also suggest that HPC is anticipated to be completed around June 2026. It is acknowledged that there is a relatively short period of overlap where temporary construction activity will occur concurrently at Hinkley Point C and the Proposed Development, and as a result there may be competition for construction labour between the two projects. However, the nature of the work will be very different with Gravity under physical construction i.e. site and buildings, and Hinkley being in advanced Mechanical and Electrical (M and E) and fit out stages into operational readiness. Therefore quite different labour pools. The projections for the HPC M and E labour force predicted a much smaller percentage of local labour and higher levels of migrant labour, due to the higher level and specialist skills required.
- 7.5.67 Construction work at Hinkley Point C is expected to have peaked and be winding down as activity at the Proposed Development is ramping up. It is therefore anticipated that a proportion of the locally based construction workforce at HPC can benefit from the Proposed Development ramping up construction from 2022 providing continuity of work and opportunity for continued employment by those already within the local area.

Summary of Receptor Sensitivity

- 7.5.68 In the context of the baseline conditions described in the above section, **Table 7.7** below identifies the receptors which are likely to experience impacts from the Proposed Development, thus requiring consideration within the impact assessment. **Table 7.7** below also determines the sensitivity of each identified receptor and the development phase(s) when it would be likely to be affected by the Proposed Development.

Receptor	Sensitivity	Rationale	Phase(s) of likely effects
Labour Market Study Area	High	The scale of the Proposed Development is likely to introduce new pressures within the labour market resulting from the short- and long-term employment associated with the delivery and subsequent operation of the Proposed Development.	Construction and Operation
Housing Market Study Area	Medium	The scale of the Proposed Development is likely to introduce new operational employees who will require homes within the HMA. Up to 750 homes are to be provided on site and local skills and training commitments for local people who are likely to already have accommodation within the housing market area.	Operation
Key business sector: Construction	High	The construction sector in the Labour Market Study Area employs 6,000 people. The scale of the Proposed Development is likely to have distortionary effects on the sector. However, a significant portion of labour employment is anticipated to come from the existing local construction workforce at Hinkley Point C. It is acknowledged that the Hinkley Point C project is scheduled for completion in 2026, whereas work will commence on the Proposed Development in 2022. The respective projects will have different skill and labour force requirements during this time therefore limited competition is expected. There will be a phased demobilisation of HPC relating to the changing nature of the project and changing skill / workforce requirements. This will enable transition, retraining and deployment as a positive legacy beyond HPC and will enable a transition from temporary employment into more permanent roles.	Construction
Key business sector: manufacturing	High	The manufacturing sector in the Labour Market Study Area employs 10,500 people. The 1 million sqm of advanced manufacturing floorspace within Proposed Development is anticipated to result in a significant increase in manufacturing jobs, which is unlikely to be able to be fully absorbed by the existing labour market and thus have distortionary effects on the sector	Operation
Key business sector: Professional, scientific & technical	Medium	The professional, scientific & technical sector employs 8,000 people within the Housing and Labour Market Study Area. The 100,000 sqm of commercial space within the Proposed Development is anticipated to support a substantial number of professional, scientific & technical jobs, which may have distortionary effects on the sector.	Operation
Key business sector: services	Low	The services sector (the combination of retail, accommodation, and food & beverage activities) supports the greatest amount of employment within the Housing and Labour Market Study Area at 20,500 jobs. The economic activity stimulated by the increase in construction employment in the short term, and operational employment in the long term, will result in increased spending within the services sector and supply chain. This is likely to increase the demand for services within the Housing and Labour Market Study Area, which is anticipated to have impacts on the services sector.	Construction and operation

Table 7.7 Summary of Receptor Sensitivity

7.6 Embedded Mitigation

Demolition and Construction

- 7.6.1 A Framework Demolition and Construction Environmental Management Plan (FDCEMP) is submitted with the ES (Appendix 4.1), of relevance to this assessment the FDCEMP will set out the responsibilities with regards to compliance with legislation and to implement any mitigation measures. The FDCEMP details management measures to minimise environmental impacts from the demolition and construction phase of the Proposed Development. In the context of economics this will apply to maintaining access to areas of employment and residences. This is secured through the Compliance Form.
- 7.6.2 It is acknowledged that the approved village enhancement scheme was identified as mitigation for the 2017 Planning Consent and will be implemented one year from the opening of the link road, i.e., in autumn 2022. This is therefore factored into the 2032 Baseline Assessment.
- 7.6.3 Temporary workforce accommodation for up to 200 workers during the construction and demolition phase of the Proposed Development is included within the LDO parameters. While this is related to the Housing market receptor, it is more closely aligned with community infrastructure and construction worker travel patterns and is therefore covered within **Chapter 8 – Health, Social and Wellbeing** and **Chapter 9 Transport** respectively.

Operational

- 7.6.4 Mitigation which has been embedded into the development parameters and relied upon as part of the operational assessment include:

- Provision of up to 750 residential units;

7.7 Assessment of Likely Effects

Construction Phase

Capital Expenditure and Gross Construction Employment

- 7.7.1 The construction of the infrastructure and buildings described in the LDO parameters are estimated to cost £1.872 billion. This estimate has been derived using BCIS build cost data for Sedgemoor (rebased to Q3 2021) and the quantum of development parameters in the Description of Development, including:
- 100,000 sqm of mixed commercial space, at a mean build cost of £3,081 / sqm. This portion of the Proposed Development is estimated to cost a total of £308.1 million.
 - 1,000,000 sqm of advanced manufacturing space, at a mean build cost of £1,499 / sqm. This portion of the Proposed Development is estimated to cost £1.499 billion.
 - 750 residences for workers, at a mean build cost of £1,281 / sqm. The average home size in England is 67.7 sqm. This element of the Proposed Development is estimated to cost £65.0 million.
- 7.7.2 Therefore, the total 1,100,000 sqm of floorspace plus the 750 homes is estimated to require £1.872 billion in capital expenditure.
- 7.7.3 In high level terms, the gross construction employment is calculated by the following formula:

$$\frac{\text{Capital expenditure (£1,872,143,000)}}{\text{Turnover required to support one construction worker (£164,595)}} = 11,375 \text{ (PYE)}$$

7.7.4 Construction employment is reported in Person Year Equivalents (PYE), i.e. the number of full-time jobs which could be supported for a single year based on the capital expenditure.

7.7.5 Within the list of committed development for the EIA Assessment for inclusion in the 2032 Baseline (Appendix F), no sites supporting employment uses have been scoped in. Consequently, no additional employment land is considered within this assessment.

Net Construction Employment

7.7.6 This level of expenditure is estimated to support 11,375 gross person years equivalent (PYE) of employment over the course of the construction phase. Only a proportion of total construction employment would occur within the Labour Market Study Area due to mobility of labour, competition from externally located construction firms and supply chains. To take account of these factors, the additionality assumptions detailed in **Table 7.8** below have been used to convert the estimated gross construction employment from the Proposed Development.

7.7.7 The additionality factors are set out in **Table 7.8** below.

Additionality factor	Value	Rationale
Deadweight	9%	The 2017 Hybrid Consent for Huntspill Energy Park will be delivered in absence of the Proposed Development coming forward. The Huntspill Energy Park ES estimated a build cost of £148.1 million in 2012, and uprating this to 2021 prices results in an estimated capital expenditure of £174.2 million. This level of expenditure could support an estimated 1,060 PYE construction jobs, which is approximately 9% of the gross employment supported by the Proposed Development. This therefore represents the deadweight.
Leakage	45%	The scale of the Proposed Development means that the construction labour market within the Labour Market Study Area is unlikely to be able to absorb the full requirement of labour, thereby necessitating the acquisition of resources from a wider area
Displacement	60%	The scale of the Proposed Development and the target sectors is likely to demand a diverse range of skills and capabilities. This is anticipated to result in opportunities which pay higher wages, thereby displacing existing construction workforce participants as they seek to maximise the returns on their labour
Multiplier	2.45	ONS National multiplier for construction
Adjusted Multiplier	1.72	The national multiplier has been adjusted by 75% to translate the impacts to a regional level, and then that figure is then adjusted by 50% to estimate the impacts specific to the Labour Market Study Area. This is done through the formula: $\left[\left[\text{National multiplier (2.45)} - 1 \right] * 0.75 \right] * 0.5 + 1 = \text{adjusted multiplier}$
Total additionality	34.4%	The total additionality is the factor by which gross jobs are adjusted to estimate the level of net additional jobs resulting from the Proposed Development. The total additionality figure is calculated through the following formula: $(1 - \text{deadweight}) * (1 - \text{displacement}) * (1 - \text{leakage}) * \text{adjusted multiplier} = \text{total additionality}$

Table 5.8 Construction Additionality

- 7.7.8 The application of the total additionality to the estimated 11,375 gross jobs results in an estimated 3,920 net construction jobs.¹⁷ The construction phase is anticipated to be spread over a 10-year period up to 2032 with varying levels of activity expected in any one given year.
- 7.7.9 The level of construction employment required to deliver the Proposed Development is anticipated to result in distortions to the labour market within the Study Area by creating new employment opportunities. There is likely to be demand for construction labour from other projects and sites over the period up to 2032 to deliver other development sites.
- 7.7.10 There will be a period of overlap of the construction phases for Hinkley Point C and the Proposed Development, however activity is anticipated to wind down as Hinkley Point C near completion (programmed for 2026). This means that the Hinkley Point C construction workforce can be retained and redeployed to the Proposed Development where possible. This will retain jobs in the area and maintain continuity of employment within the local area. Some degree of training or re-skilling may be required, however it is assumed that the construction labour force at HPC will have broadly transferrable skillsets including but not limited to: ground workers, plant operators, drivers, security, catering and housekeeping through to HGV and bus drivers, steel fixers, project managers, welders, manufacturing and assembly mechanical and electrical engineers .
- 7.7.11 The Labour Market is a **High** sensitivity receptor which is anticipated to experience a **High** magnitude of change. This is expected to result in **Substantial Beneficial temporary** (but long term) effects persisting for the duration of the construction phase up to 2032, which is **Significant** in EIA terms.

Key Business Sector: Construction

- 7.7.12 The key sector likely to experience economic effects from the Proposed Development during the construction phase is the construction sector.
- 7.7.13 GVA generated through the construction phase of the Proposed Development will act as a stimulus to the wider construction sector and induce multiplier effects. The creation of 3,920 net temporary construction jobs within the Study Area is anticipated to generate some £257.6 million Net GVA over the construction period.
- 7.7.14 The net GVA generated through construction employment associated with the Proposed Development would result in a **High** magnitude of change on the construction sector receptor (a **High** sensitivity receptor as per **Table 7.1**), resulting in a **Substantial Beneficial temporary** effect, which is **Significant** in EIA terms.

Indirect Impacts

- 7.7.15 The services sector is likely to experience economic impacts from the Proposed Development during the construction sector. The wages earned by the construction labour force will be spent at local food & drink, retail, and recreational establishments, stimulating additional economic activity over the course of the construction phase.
- 7.7.16 The ONS Family Spending Report for the financial year ending 2020, the period immediately preceding the COVID-19 pandemic, notes that average monthly household spend in the UK was £2,548, based on the average UK household size of 2.4 people. The Report details that 55% of household spend is on discretionary items. Thus, the average household is anticipated to generate £1,299 in discretionary expenditure each month.
- 7.7.17 Therefore, the net 3,290 PYE of construction employment is anticipated to generate £25.5 million in additional discretionary spend in the local economy. Based on an estimated turnover to support one worker within retail and food & beverage services of £77,190, this level of

¹⁷ Person Year Equivalents for the Construction Period.

expenditure is anticipated to support 330 jobs over the construction phase. Retail and food & beverage activities GVA per head in the South West is estimated at £21,600, therefore the 330 jobs will generate an additional £7.1 million in gross GVA over the construction phase.

- 7.7.18 However, there are uncertainties regarding these impacts at this stage, particularly as supply chains may be located outside of the Study Area or even the South West depending on the nature of the spend. The indirect effects of the spending from the construction labour associated with the Proposed Development are assessed to be **Major**. These effects will be **beneficial and temporary**, lasting the duration of the construction phase. These effects will result in a **Major beneficial temporary** (yet long term) impact, which is **Significant** in EIA terms.

Operational Phase

Labour Market

- 7.7.19 Due to the nature of the Proposed Development there is a large scale operational employment associated with the use.
- 7.7.20 Based on the assumed development scenario considered within this assessment of the Proposed Development, the floorspaces allocated to the anticipated operational uses and their respective employment densities are outlined in **Table 7.9** below.

Use	Floorspace (sqm)	Employment Density	Gross Jobs
Advanced Manufacturing			
Advanced manufacturing	1,000,000	164	6,100
Manufacturing Support Space			
R&D	35,000	60	585
Industrial Processes	7,500	47	160
Storage/Distribution	15,000	80	190
Other supporting uses	7,500	60	125
Total	65,000		1,060
Supporting & Ancillary uses			
Nursery	1,000	6	55
Hotel/conference centre	8,500	3*	65
Sports/leisure centre	8,000	n/a	50**
Gym	7,500		
Retail/café	750	15	50
Health Centre	750	33	25
37 Club***	2,500	n/a	0
Various other	6,000	60	100
Total	35,000		345
Grand Total	1,100,000		7,505

Table 7.9 Operational employment floorspaces and densities

- 7.7.21 As shown in **Table 7.9** above, employment density assumptions have been applied to the proposed floorspace quantum to calculate likely gross employment requirements for each employment generating use within Description of Development. This is expressed in terms of gross number of full-time equivalent (FTE) workers likely to be directly employed in support of each operational use.
- 7.7.22 The roles involved in the uses identified in **Table 7.9** represent high quality and productive jobs, particularly within advanced manufacturing and manufacturing support uses. Combined with ambition to recruit from the local area wherever possible, with a Framework setting formal targets and KPIs for local recruitment the Proposed Development is well aligned to policy ambition around clean and inclusive growth. The Framework and Skills Charter also includes other targets, such as for graduate, apprentice, work experience and internship schemes.

- 7.7.23 Whilst the exact operational employment associated with each detailed phase of development which comes forward by the market, **Table 7.9** above indicates that a total of 7,505 gross FTE workers would be required per annum to support the proposed operational employment use.
- 7.7.24 In absence of the Proposed Development being delivered, it is assumed that the 2017 Hybrid Planning consent for Huntspill Energy Park would come forward. The Huntspill Energy Park ES notes that an estimated 4,020 direct operational jobs would be supported. Therefore, the Proposed Development is anticipated to support 3,485 gross jobs over and above those which would come forward through the Huntspill Energy Park development.
- 7.7.25 The provision of these potential employment opportunities will stimulate GVA throughout the Study Area and beyond into national supply chains.
- 7.7.26 Operational employment would result in a **High** magnitude of change on the Labour Market receptor (a **High** sensitivity receptor as per **Table 7.1**), resulting in a **Permanent Substantial Beneficial** effect, which is **Significant** in EIA terms.

Housing Market

- 7.7.27 The Proposed Development will deliver up to 750 residential units. The units will be targeted at employees on site to support clean and inclusive growth opportunities and encourage the workforce, especially young professional people to live locally. The housing units provide access to suitable and affordable housing close to the employment cluster.
- 7.7.28 As these residential units will not be open market homes, they will ensure the Proposed Development makes a meaningful contribution to supporting employees living locally and reduce the pressure on the Sedgemoor HMA generated by new employees working at the Site.
- 7.7.29 The result of delivering the Proposed Development with potential for up to 7,505 operational jobs would place pressure on the existing housing supply. It is anticipated that by the end of the Local Plan period in 2032 that there will be an additional 13,530 homes with a minimum of 6,440 being delivered during the ten-year period up to 2032¹⁸ alongside the Proposed Development. This means that the Proposed Development would provide an additional 750 homes (12%) on top of that ten-year housing figure.
- 7.7.30 It is recognised that due to the large scale of the Proposed Development labour will be required from outside of the Study Area. HMA impacts will be offset by tied residential units within the Site that will be available for employees and their families. Local recruitment and skills development will also play a key role in reducing any impact on the local housing market. Creating training and reskilling opportunities for local people to move into higher value jobs will mean that those employees will already have a home within the HMA and do not require a new home. This will also help reduce outward commuting and self-containment within the Study Area.
- 7.7.31 In economic terms the contribution of 750 homes to support operational jobs would result in a **medium** magnitude of change on the Housing Market receptor improving the quality and choice of stock for employees in combination with other housing delivery within the Sedgemoor HMA (a **medium** sensitivity receptor as per **Table 7.1**), resulting in a **Permanent moderate Beneficial** effect, which is **Significant** in EIA terms.

Key business sector: manufacturing

- 7.7.32 The Description of Development states that the maximum parameters for development are one million sqm of manufacturing floorspace. As the Proposed Development is being taken forward through a market-led approach, the specific developments which will come forward on

¹⁸ Based on a target of 644 units per annum.

the Site are not yet known. To that end, a series of assumptions have been made regarding the most likely sectors which will occupy the Site, and their proportion of the total floorspace. It is understood that it is priority at local, regional and national levels to support advanced manufacturing. There are already existing advanced manufacturing hubs for the chemicals industry at Grangemouth and at Humberside, so it is unlikely that Gravity would compete with these clusters.

7.7.33 Within the South West there is established expertise within aerospace and advanced engineering. Therefore, an assumption has been made that Gravity will be developed to complement and diversify existing strengths, but also reposition the South West for new growth sector opportunities in advanced manufacturing, particular around low carbon transport and associated supply chains.

7.7.34 It is anticipated that 1,000,000 sqm will be dedicated to advanced manufacturing uses. Market research of existing advanced manufacturing facilities, specifically related to vehicle manufacturing, has revealed an average employment density which equates to one job per 149 sqm of floorspace. With the continued progression and integration of automation technology in manufacturing, it is assumed that the Proposed Development will have slightly lower density than existing facilities (10%). This equates to an employment density of one job per 164 square metres.

7.7.35 Therefore, the gross manufacturing employment anticipated within the Proposed Development has been calculated via the following formula:

$$\frac{\text{Floorspace (1,000,000)}}{\text{Employment density (164)}} = 6,100$$

7.7.36 Additionality assumptions have been applied to the gross manufacturing employment figure to estimate the amount of net additional jobs associated with the Proposed Development. The additionality factors are set out in **Table 7.10** below.

Additionality factor	Value	Rationale
Deadweight	50%	In absence of the Proposed Development, the development described in the 2017 Hybrid Consent for the Huntspill Energy Park would be delivered on the Site. This development includes over 54,300 sqm of industrial floorspace and 101,310 of storage/distribution space. These uses most closely align to what is envisioned within the manufacturing space of the Proposed Development. The Huntspill Energy Park ES notes that an estimated 2,965 jobs could be supported within this floorspace, which is approximately 50% of the manufacturing employment estimated within the Proposed Development and therefore represents the deadweight.
Leakage	40%	The scale of the Proposed Development means that the manufacturing sector within the Labour Market Study Area is unlikely to be able to absorb the full requirement of labour, thereby necessitating the acquisition of resources from a wider catchment area.
Displacement	35%	The scale of the Proposed Development and the target sectors is likely to demand a diverse range of skills and capabilities. This is anticipated to result in opportunities which pay higher wages, thereby displacing existing manufacturing workforce participants as they seek to maximise the returns on their labour.
Multiplier	2.30	ONS National multiplier for manufacturing of motor vehicles, trailers and semi-trailers .
Adjusted Multiplier	1.64	The national multiplier has been adjusted by 75% to translate the impacts to a regional level, and then that figure is then adjusted by 50% to estimate the impacts specific to the Labour Market Study Area. This is done through the formula: $\left[\left[\left[\text{National multiplier (2.45)} - 1 \right] * 0.75 \right] * 0.5 \right] + 1 = \text{adjusted multiplier}$
Total additionality	32%	The total additionality is the factor by which gross jobs are adjusted to estimate the level of net additional jobs resulting from the Proposed Development. The total additionality figure is calculated through the following formula: $(1 - \text{deadweight}) * (1 - \text{displacement}) * (1 - \text{leakage}) * \text{adjusted multiplier} = \text{total additionality}$

Table 7.10 Manufacturing Additionality

- 7.7.37 The direct impacts of the Proposed Development on the manufacturing sector are assessed to be **Substantial**. The 6,100 manufacturing jobs anticipated equate to 58% of the existing manufacturing workforce within the Labour Market Study Area. The application of the total additionality to the estimated 6,100 gross manufacturing jobs results in an estimate of 1,950 net additional manufacturing jobs.
- 7.7.38 The level of net additional manufacturing employment represents a significant increase over the existing manufacturing labour force within the Labour Market Study Area (+18.5%) Therefore, it is likely that the Proposed Development will result in distortions within the manufacturing sector, and it is anticipated that a proportion of the manufacturing labour required will be sourced from beyond the Labour Market Study Area.
- 7.7.39 Within the list of committed development for the EIA Assessment for inclusion in the 2032 Baseline (**Appendix F**), no sites supporting employment uses have been scoped in. Consequently, no additional manufacturing employment land is considered within this assessment.
- 7.7.40 The manufacturing sector is **High** sensitivity receptor which is anticipated to experience a **High** magnitude of change resulting from the Proposed Development in combination with the identified development in the 2032 Baseline.

- 7.7.41 Based on the established EIA criteria these impacts are assessed to result in **Substantial Beneficial and permanent** effects, lasting for the duration of the operation of the Proposed Development which are **Significant** in EIA terms.

GVA Impacts

- 7.7.42 The key economic sector is likely to experience impacts resulting from the operational phase of the Proposed Development. GVA generated through the manufacturing employment is likely to stimulate further activity within the sector and induce multiplier effects.
- 7.7.43 The 1,950 net additional manufacturing jobs (at full capacity) is estimated to generate £134.8 million in net GVA per annum throughout the operational life of the Proposed Development. Over a 25-year horizon (2032-2057) this equates to £3.370 billion net GVA. The net present value (NPV) of this GVA is £1.521 billion.
- 7.7.44 The net GVA generated through manufacturing employment associated with the Proposed Development would result in a **High** magnitude of change of the manufacturing sector receptor (a **High** sensitivity receptor as per **Table 7.1**), resulting in a **Substantial Beneficial and permanent** effect, which is **Significant** in EIA terms.

Key business sector: professional, scientific & technical

- 7.7.45 The Description of Development notes that the maximum parameters for development include up to 100,000 sqm of commercial space. Due to the market-led approach of the Proposed Development, the specific nature of the development which will come forward within this floorspace is not yet known. It is understood that this floorspace will host supporting and ancillary functions to the manufacturing space.
- 7.7.46 For the purposes of this assessment, it has been assumed that 65,000 sqm of the commercial space will be dedicated to uses supporting the manufacturing elements, hosting a range of professional, scientific and technical employment (see **Table 7.9**). The weighted average of the employment densities across the various uses equates to one job per 61 sqm.
- 7.7.47 Therefore, the gross operational employment is estimated by the following formula:

$$\frac{\text{Floorspace (65,000 sqm)}}{\text{Employment density (61)}} = 1,060$$

- 7.7.48 Additionality assumptions have been applied to translate the gross jobs figure into an estimate of the number of net additional jobs in the economy. The additionality assumptions are set out in **Table 7.11** below.

Additionality factor	Value	Rationale
Deadweight	99%	The 2017 Hybrid Consent for the Huntspill Energy Park includes over 21,000 sqm of floorspace for R&D activities. The Huntspill Energy Park ES notes that an estimated 1,055 professional, scientific & technical jobs could be supported within the development. This equates to over 99% of the professional, scientific & technical employment anticipated within the Proposed Development. This therefore represents the deadweight.
Leakage	40%	The scale of the Proposed Development means that the professional, scientific & technical sector within the Housing and Labour Market Study Area is unlikely to be able to absorb the full requirement of labour, thereby necessitating the acquisition of some resources from a wider catchment area.
Displacement	35%	The scale of the Proposed Development and the target sectors is likely to demand a diverse range of skills and capabilities. This is anticipated to result in opportunities which pay higher wages, thereby displacing existing professional, scientific & technical workforce participants as they seek to maximise the returns on their labour
Multiplier	1.8	ONS National multiplier for other professional, scientific & technical activities
Adjusted Multiplier	1.14	The national multiplier has been adjusted by 75% to translate the impacts to a regional level, and then that figure is then adjusted by 50% to estimate the impacts specific to the Labour Market Study Area. This is done through the formula: $\left[\left[\text{National multiplier (2.45)} - 1 \right] * 0.75 \right] * 0.5 + 1 = \text{adjusted multiplier}$
Total additionality	0.6%	The total additionality is the factor by which gross jobs are adjusted to estimate the level of net additional jobs resulting from the Proposed Development. The total additionality figure is calculated through the following formula: $(1 - \text{deadweight}) * (1 - \text{displacement}) * (1 - \text{leakage}) * \text{adjusted multiplier} = \text{total additionality}$

Table 7.11 Professional, scientific & technical additionality

- 7.7.49 The application of the total additionality to the gross jobs figure results in an estimated six net additional jobs over and above what would come forward in the 2032 Baseline.
- 7.7.50 Within the list of committed development for the EIA Assessment for inclusion in the 2032 Baseline (Appendix F), no sites supporting employment uses have been scoped in. Consequently, no additional professional, scientific & technical employment land is considered within this assessment.
- 7.7.51 The professional, scientific & technical sector is a **Medium** sensitivity receptor which is anticipated to experience a **Negligible** magnitude of change as a result of the employment generated by the Proposed Development with reference to the 2032 Baseline
- 7.7.52 As defined by the EIA significance criteria this impact is assessed to result in a **Negligible Beneficial and permanent** effect, which is **Not Significant** in EIA terms.

GVA Impacts

- 7.7.53 GVA generated through professional, scientific & technical employment associated with the operational phase of the Proposed Development will stimulate additional activity within the sector and induce multiplier effects.
- 7.7.54 The creation of 6 net additional professional, scientific & technical jobs within the Study Area (at full occupation) is anticipated to generate £361,900 net GVA per annum. Over a 25-year

horizon this equates to £9.0 million in net GVA. Discounting this back to the base year of 2021 results in £4.0 million NPV GVA.

- 7.7.55 The net GVA generated through the professional, scientific & technical employment associated with the Proposed Development would result in a **Low** magnitude of change on the professional, scientific & technical sector (a **Medium** sensitivity receptor as per **Table 7.1**), resulting in a **Minor Beneficial and permanent** effect, which is **Not Significant** in EIA terms.

Key business sector: services

- 7.7.56 The Description of Development notes that the maximum parameters of development include 100,000 sqm of commercial space. As noted above, 65,000 sqm of this space is assumed to be complimentary to the primary advanced manufacturing functions within the Proposed Development. The remaining 35,000 sqm are therefore assumed to be ancillary support uses which provide convenience and quality of life functions on site. The assumed development scenario includes the uses set out in **Table 7.9**.
- 7.7.57 A blended employment density has been adopted to approximate the level of employment which may be supported by the ancillary uses (please see **Table 7.9** for further detail on areas and densities). Overall, an average density of one job per 101 sqm has been used within the assessment. Therefore, the estimated number of gross jobs has been calculated using the following formula:

$$\frac{\text{Floorspace (35,000 sqm)}}{\text{Employment density (101)}} = 345$$

- 7.7.58 Additionality assumptions have been applied to translate the gross jobs figure into an estimate of the net additional jobs to the economy. The additionality assumptions for the services employment are set out in **Table 7.12** below.

Additionality factor	Value	Rationale
Deadweight	45%	It is assumed that the 2017 Hybrid Consent for Huntspill Energy Park will come forward if the Proposed Development is not delivered. While there is no explicit provision for services floorspace it is anticipated that some services employment would be present in the Huntspill development to cover administrative responsibilities, site security, maintenance and associated works. Deadweight has been set at 45% to provide a conservative estimate.
Leakage	10%	The wages within the services sector are generally on the lower end of the scale and it is unlikely that they would be at a threshold to attract a significant level of employment from beyond the Labour Market Study Area.
Displacement	75%	The supporting service uses within the Proposed Development may be attractive employment opportunities for people living in proximity to the Site. That, alongside the relatively low barrier to entry (i.e. no requirement for highly skilled workers or specific qualification attainment) may result in high levels of displacement.
Multiplier	1.29	ONS National multiplier for other personal services
Adjusted Multiplier	1.14	The national multiplier has been adjusted by 75% to translate the impacts to a regional level, and then that figure is then adjusted by 50% to estimate the impacts specific to the Labour Market Study Area. This is done through the formula: $\left[\left[\text{National multiplier (2.45)} - 1 \right] * 0.75 \right] * 0.5 + 1 = \text{adjusted multiplier}$
Total additionality	54.3%	The total additionality is the factor by which gross jobs are adjusted to estimate the level of net additional jobs resulting from the Proposed Development. The total additionality figure is calculated through the following formula: $(1 - \text{deadweight}) * (1 - \text{displacement}) * (1 - \text{leakage}) * \text{adjusted multiplier} = \text{total additionality}$

Table 7.12 Services additionality

- 7.7.59 The application of the total additionality on the number of gross jobs figure results in an estimate of 50 net additional jobs.
- 7.7.60 The 50 net additional services jobs represent an increase of just under 1% within the services sector in the Housing and Labour Market Study Area.
- 7.7.61 Within the list of committed development for the EIA Assessment for inclusion in the 2032 Baseline (Appendix F), no sites supporting employment uses have been scoped in. Consequently, no additional services employment land is considered within this assessment.
- 7.7.62 The services sector is a **Low** sensitivity receptor which is anticipated to experience a **Medium** magnitude of change resulting from the employment of the Proposed Development with reference to the 2032 Baseline.
- 7.7.63 As defined by the EIA significance criteria this impact is assessed to result in a **Minor Beneficial and permanent** effect, which is **Not Significant** in EIA terms.

GVA Impacts

- 7.7.64 The services sector is likely to experience impacts resulting from the operational phase of the Proposed Development. GVA generated through the services employment is likely to stimulate additional economic activity within the sector and induce multiplier effects.
- 7.7.65 The 50 net additional service jobs (at full operational capacity) is estimated to generate £2.3 million in net GVA per annum. Over a 25-year operational horizon this equates to £57.8 million

in net additional GVA. Discounting the future GVA back to 2021 prices translates to £26.1 million in NPV GVA.

- 7.7.66 The net GVA generated through the services employment associated with the Proposed Development would result in a **Medium** magnitude of change on the services sector receptor (a **Low** sensitivity receptor as per **Table 7.1**), resulting in a **Minor Beneficial and permanent** effect, which is **Not Significant** in EIA terms.

Indirect Impacts

- 7.7.67 The development of the Site and the integration of the supply chain would bring wider indirect benefits to the region, including increasing indirect GVA and indirect employment.
- 7.7.68 The ONS Family Spending Report for the financial year ending 2020, the period immediately preceding the COVID-19 pandemic, notes that average monthly household spend in the UK was £2,548, based on the average UK household size of 2.4 people. The Report details that 55% of household spend is on discretionary items. Thus, the average household is anticipated to generate £1,299 in discretionary expenditure each month.
- 7.7.69 Therefore, the net operational employment of 2,005 (FTE) is anticipated to generate £13.0 million in discretionary spend per annum. Based on the estimated level of turnover required to support one employee in retail or food & beverage activities of £77,190, this level of expenditure could support an estimated 170 gross jobs per annum. An estimated £21,600 GVA per head is associated with retail and food & beverage employment in the South West, thus the 170 gross jobs are estimated to generate £3.6 million in gross GVA per annum.
- 7.7.70 However, there are uncertainties regarding these impacts at this stage, particularly as supply chains may be located outside of the Study Area or even the South West depending on the requirements of occupiers, therefore an assessment of **moderate beneficial impact** magnitude on the **high** sensitivity (Labour Market Study Area) has been identified, which is **Significant** in EIA terms.

7.8 Further Mitigation

- 7.8.1 The predicted economic impacts resulting from the Proposed Development, in combination with the development anticipated in the 2032 Baseline are positive effects on the identified sensitive receptors.
- 7.8.2 Whilst a large number of permanent and temporary jobs will be created, to maximise the opportunity for local people and others to re-train and maximise their potential a number of further mitigation measures are proposed and set out below:
- A Clean and Inclusive Growth Strategy (2020) (available at www.thisisgravity.co.uk) has been prepared which sets out an ambitious vision for Gravity to deliver a socially inclusive development that considers clean and inclusive economic growth as critical to its success. A Design Guide has also been prepared and is submitted with the LDO, which sets out the design and placemaking principles.
 - The Gravity Skills Charter (2021) is intended to set out the high-level principles and objectives for Gravity addressed through occupier specific Employment and Skills Plans which will establish opportunities for work experience, apprenticeships and set out how recruitment will be managed to optimise the recruitment and development of local people. Gravity and its partners, including the councils and the Local Enterprise Partnership, will work primarily with Bridgwater and Taunton College and through them, with other educational institutions, employers, occupiers and skills advisers to shape the local labour force to meet industry and market requirements. In support of this lies a series of actions designed to raise ambitions and aspirations and help residents to understand the training opportunities available to them at Gravity. Investment priorities for curricular development,

new premises, and courses as well as support for schools will be included in the investment plan to ensure the locality can respond to realise local opportunities. The Gravity Skills Charter is secured through the S106 Agreement.

- The Gravity Business Charter (2021) reinforces the Growth Mission at Gravity recognising that in the UK, Government has committed to 'net zero carbon' by 2050. This requires a seismic shift in thinking and action to respond. Creating a route to delivering clean and inclusive growth is the greatest industrial opportunity in our history. At Gravity, the strategy is to seize this opportunity to make a smart campus and integrated community that delivers the 4th Industrial Revolution, providing an exemplar in the UK and a beacon for wayfinding on this Clean Growth Journey. Gravity will proactively support and encourage occupiers and collaborators to make a commitment to promote and facilitate the economic development of the locality in conjunction with the private sector, local councils, local enterprise partnerships, and business organisations. The Gravity Business Charter is secured through the S106 Agreement and draws out and focusses on:
 - Championing the South West
 - through marketing and enquiry management.
 - Establishing a digital innovation alliance across the M5 growth corridor via the 5G Create project on logistics
 - Host test beds and green finance initiatives to develop green solutions
 - via 5G test bed project and linking this culture into management strategies within the LDO, seeking new collaborations with potential partners, and following up on opportunities that arise
 - Incubating innovation, start-ups, enabling new forms of business, energy and transport technologies
 - by making provision within the LDO for flexible business space to accommodate.

7.8.3 There is a potential legacy beyond HPC through the repurposing of the Somerset Energy Innovation Centre to support the supply chain mobilisation and development for the Gravity project, subject to agreement with the County Council as landlord from 2026.

7.8.4 The Further Mitigation for the Proposed Development includes the implementation of measures which to reduce the risk of significant adverse effects on environmental receptors as a result of the construction and operational activities, and to maximise opportunities for local people to access higher paid and higher skilled employment opportunities than are currently contained within the Study Area. This responds to the wider clean and inclusive growth agenda and industrial strategy and seeks to ensure that new opportunities are accessed by local people. Through implementation of these agreements more, better paid jobs can be accessed by local people and therefore reduces outward commuting and has the potential to retain more economically active young people within the Study Area.

7.9 Residual Effects

7.9.1 The likely residual effects from the construction and operation of the Proposed Development are identified in combination with further mitigation measures listed in [Section 7.8](#) are:

Potential Effect	Duration	Impacted receptor	Receptor Sensitivity	Residual Magnitude of change	Residual effect level	Residual EIA Significance
Construction Phase						

Potential Effect	Duration	Impacted receptor	Receptor Sensitivity	Residual Magnitude of change	Residual effect level	Residual EIA Significance
Net construction employment	Short term	Labour Market (FEMA area)	High	High	Substantial Beneficial	Significant
Key business sector	Short term	construction	High	High	Substantial Beneficial	Significant
Operational Phase						
Net operational employment	Permanent	Labour market	High	High	Substantial Beneficial	Significant
Net operational employment	Permanent	Housing Market	Medium	Medium	Moderate Beneficial	Significant
Key business sector	Permanent	Manufacturing	High	High	Substantial Beneficial	Significant
Key business sector	Permanent	Professional, scientific & technical	Medium	Negligible	Negligible Beneficial	Not Significant
Key business sector	Permanent	Services	Low	Medium	Minor Beneficial	Not Significant
Supply Chain and Clustering	Permanent	Labour Market (FEMA area)	High	Medium	Moderate Beneficial	Significant

Table 7.63 Summary of residual effects

7.10 Monitoring

- 7.10.1 No significant residual adverse effects are identified within this chapter and therefore no formal monitoring is proposed for these effects in respect of the ES.
- 7.10.2 It should however be noted that the response to operationalising the Skills Charter and Business Charter will be reported upon within the Environmental and Social Governance ((ESG) reporting, the commitment to which is made within the Gravity Monitoring and Management Plan submitted with the LDO. Positive outcomes and inclusion are key to success therefore transparent reporting on progress in training and recruitment will be important to understand. Information will be reported to the local delivery groups and there will need to be a multi-agency approach to ensure the timely delivery of investment into skills and training to ensure the workforce is available and ready in a timely way to enable business operations. Beyond operational start, there will be a need for ongoing workforce development to sustain a pipeline of labour and this will require information and support into schools, to promote new career opportunities and align advice on pathways to further and higher education and to work.

7.11 Summary

- 7.11.1 This Chapter has been prepared by Stantec UK Ltd to provide an assessment of the likely significant economic effects of the Proposed Development.
- 7.11.2 The Proposed Development responds to national, regional, and local policy and strategy documents related to economic development. Relevant documents include: the National Planning Policy Framework; the UK's Industrial Strategy: Building a Britain fit for the future; the Heath of the South West Local Industrial Strategy; the Sedgemoor Local Plan; the Bridgwater Vision; the Sedgemoor Economic Development Strategy; and the Sedgemoor Core Strategy.

- 7.11.3 The methodology used to assess the likely significant economic effects considers both primary impacts, which are effects that can be directly attributed to the Proposed Development such as employment created during the construction and operational phases; and secondary impacts, which are effects that are indirectly generated from the Proposed Development such as increase spend in the local economy.
- 7.11.4 The primary impacts are measured by estimating the number of net jobs created and the Gross Value Added associated with this employment. The secondary impacts are measured by estimating the amount of additional consumer spending generated by the new workers and residents.
- 7.11.5 The economic conditions of the local area show that the unemployment rate is slightly above that in the South West and UK; the rates of high level qualification attainment are below that of the South West and UK; the median weekly wages lag behind the wider South West and national average; and employment is distributed across the main industrial sectors in broadly similar fashion to the South West and UK workforces.
- 7.11.6 Embedded mitigation includes a Framework Demolition and Construction Environmental Management Plan to ensure compliance with legislation and set out management measure to minimise adverse impacts. In the context of economics, this will apply to maintaining access to areas of employment and residences. Additionally, temporary workforce accommodation for up to 200 workers will be provided during the construction phase, and up to 750 residential units will be created for staff in the operational phase.
- 7.11.7 Further mitigation measures are proposed to maximise the employment opportunities for local people. The future mitigation measures include: A Clean and Inclusive Growth Strategy; the Gravity Skills Charter; and the Gravity Business Charter. Through the implementation of these agreements, more high value jobs will be accessible to local people.
- 7.11.8 The residual impacts of the Proposed Development are:
- Net construction employment – The Proposed Development is estimated to support 3,920 net additional temporary construction jobs. This is concluded to result in a temporary substantial beneficial impact
 - Net construction Gross Value Added – the net construction jobs are estimated to generate £257.6 million in Gross Value Added. This is concluded to result in a temporary substantial beneficial impact
 - Net manufacturing employment – The Proposed Development is estimated to support 1,950 net additional manufacturing jobs. This is concluded to result in a permanent substantial beneficial impact
 - Net professional, scientific & technical employment – The Proposed Development is estimated to support 6 net additional professional, scientific & technical jobs. This is concluded to result in a permanent negligible beneficial impact
 - Net services sector employment – The Proposed Development is estimated to support 170 net additional services jobs. This is concluded to result in a permanent minor beneficial impact
 - Housing market – The Proposed Development will include up to 750 homes for staff at the Site. This is concluded to result in a permanent moderate beneficial impact
- 7.11.9 The assessment therefore concludes that Proposed Development is likely to result in significant impacts (within the context of EIA Regulations) in relation to: Net construction employment; Net construction GVA; Net manufacturing employment; and Housing Market. In all cases, the predicted likely significant impacts would be beneficial in nature.

7.12 Referencing

7.12.1 The statistical sources and references used within the chapter are listed below.

- Office for National Statistics. Annual Population Survey (2020) local authority based
- Office for National Statistics. Annual Survey of Hours and Earnings (2020) local authority based
- Office for National Statistics. Business Register and Employment Survey (2019) local authority based
- Office for National Statistics. Population Estimates (2019) local authority based
- Office for National Statistics. Population Projections (2020) local authority based
- Office for National Statistics. Regional Gross Value Added by region in the UK
- Office for National Statistics. House price statistics for small areas in England and Wales
- Sedgemoor District Council (2020) 5-year Housing Land Supply Statement
- JG Consulting (2016) Strategic Housing Market Assessment
- Sedgemoor District Council (2016) Sedgemoor Employment Land Review
- Sedgemoor District Council (2020) Hinkley Point C Annual Monitoring Report 2018-2019

8 Health, Wellbeing and Social Impacts

8.1 Introduction

- 8.1.1 This chapter presents the findings of an assessment of the likely significant effects on health, wellbeing and social impacts associated with the Proposed Development.
- 8.1.2 The chapter describes the methods used in the assessment, the relevant baseline characteristics, and the likely significant effects on relevant receptor groups during operation and demolition/ construction of the Proposed Development. It also considers the mitigation measures embedded in the Proposed Development and those that are additionally required to prevent, reduce, or offset adverse effects and reduce health inequalities.
- 8.1.3 This assessment considers the wider determinants of human health, including social determinants – drawing on the findings of other relevant chapters of this ES, including; Chapter 7 Economics, Chapter 9 Transport and Access, Chapter 10 Noise and Vibration, Chapter 11 Air Quality, Chapter 12 Biodiversity, Chapter 13 Water Environment, Chapter 14 Landscape and Visual, and Chapter 15 Climate Change, and other relevant planning documents such as the Flood Risk Assessment, and Consultation Report. A technical note assessing the impacts on community infrastructure is provided in **Appendix 8.3**, which has been considered within this chapter where relevant.
- 8.1.4 This Chapter has been prepared by Stantec. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.
- 8.1.5 The appendices associated with this Chapter are:
- Appendix 8.1 Figures
 - Figure 1 – Ward boundaries surrounding the Site
 - Figure 2 – Lower Super Output Areas surrounding the Site
 - Figure 3 – Indices of Multiple Deprivation 2011
 - Figure 4 – % Jobseekers Allowance / Universal Credit Claimants 2011
 - Figure 5 – % of 0–17-year-olds 2011
 - Figure 6 – % 18–64-year-olds 2011
 - Figure 7 – % 65+ year olds 2011
 - Appendix 8.2 Community Infrastructure Note

8.2 Policy, Legislation, Guidance and Standards

National Legislation

- 8.2.1 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended). Part 4 of Schedule 4 states that “A *description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health...*” should be included within the environmental statement.

National Policy

National Planning Policy Framework

- 8.2.2 The revised National Planning Policy Framework (NPPF) (2021) acknowledges that the purpose of the planning system is to contribute to the achievement of sustainable development which includes the importance of considering health impacts during the planning process. and covers many issues that are directly related to the determinants of health.
- 8.2.3 The NPPF identifies the three overarching objectives which must be met in order for the development to be truly *sustainable* development. These are economic, social and environmental objectives. Of particular relevance to health is the 'social objective. Paragraph 8 of the NPPF states that the planning system should support *“strong, vibrant and healthy communities...by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being.”*
- 8.2.4 The NPPF also acknowledges that planning policies and decisions should aim to achieve healthy, inclusive, and safe places which:
- “a) promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through mixed-use developments, strong neighbourhood centres, street layouts that allow for easy pedestrian and cycle connections within and between neighbourhoods, and active street frontages;*
- b) are safe and accessible, so that crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion – for example through the use of clear and legible pedestrian routes, and high-quality public space, which encourage the active and continual use of public areas; and*
- c) enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling.”* (Paragraph 92)
- 8.2.5 The NPPF is considered within the Environmental Statement as follows:
- **Section 8.5** of this chapter outlines the existing health profile within the study area, which has been used to identify local health and wellbeing needs. An assessment of potential health effects, as a result of the Proposed Development, is included in **Tables 8.4-8.11**, which includes the impact of the opportunities for economic improvement and social interaction.
 - The community and human health benefits associated with encouraging development that provides opportunities for sustainable transport and pedestrian and cycle movements are outlined in **Table 8.5 and 8.9**. This includes potential health effects.

Planning Practice Guidance (Various)

- 8.2.6 The PPG¹ identifies how positive planning can contribute to healthier communities, it notes that:
- “The design and use of the built and natural environments, including green infrastructure are major determinants of health and wellbeing. Planning and health need to be considered together in two ways: in terms of creating environments that support and encourage healthy lifestyles, and in terms of identifying and securing the facilities needed for primary, secondary*

¹ <https://www.gov.uk/guidance/health-and-wellbeing>

and tertiary care, and the wider health and care system (taking into account the changing needs of the population).” (Paragraph 1)

8.2.7 The PPG also defines a healthy place as:

“A healthy place is one which supports and promotes healthy behaviours and environments and a reduction in health inequalities for people of all ages. It will provide the community with opportunities to improve their physical and mental health, and support community engagement and wellbeing.

It is a place which is inclusive and promotes social interaction. The National Design Guide sets out further detail on promoting social interaction through inclusive design including guidance on tenure neutral design and spaces that can be shared by all residents.

It meets the needs of children and young people to grow and develop, as well as being adaptable to the needs of an increasingly elderly population and those with dementia and other sensory or mobility impairments.” (Paragraph 3)

8.2.8 The PPG is considered within the Environmental Statement as follows:

- Several of the determinants of health identified above have been considered within the assessment in **Tables 8.4-8.10**, including provision of green infrastructure, providing opportunities to improve physical and mental health, and promoting social interaction.
- Consideration has been given to vulnerable receptors, such as children, the elderly and those with pre-existing health conditions, as set out in **Section 8.4.10**.

National Guidance

8.2.9 There is a plethora of national and international level literature regarding the process of Health Impact Assessment (e.g., from the WHIASU) and the links between determinants of health and spatial planning and the built environment. More recently, guidance on health in EIA has been published which has been taken into account in this assessment, including the following:

- Health in Environmental Impact Assessment – A Primer for a Proportionate Approach (Institute of Environmental Management and Assessment, 2017)
- Addressing Human Health in Environmental Impact Assessment – Consultation Draft (International Association for Impact Assessment, 2019)
- Health Impact Assessment in Spatial Planning (Public Health England, 2020)²

8.2.10 Below, two key documents are considered in more detail: The Marmot Review was a study into health inequalities in England, which provides important context; and HUDU guidance which has been used to provide a structure for the consideration of determinants.

The Marmot Review (2010)

8.2.11 Fair Society, Healthy Lives: A Strategic Review of Health Inequalities in England Post-2010 (The Marmot Review)³ was published on 11 February 2010 (Institute of Health and Equity, 2010). This was the culmination of a yearlong independent review into health inequalities in England. Six policy objectives were developed:

² <https://www.gov.uk/government/publications/health-impact-assessment-in-spatial-planning>

³ <https://www.instituteofhealthequity.org/resources-reports/fair-society-healthy-lives-the-marmot-review/fair-society-healthy-lives-full-report-pdf.pdf>

- Give every child the best start in life (the highest priority recommendation);
- Enable all children, young people and adults to maximise their capabilities and have control over their lives;
- Create fair employment and good work for all;
- Ensure healthy standard of living for all;
- Create and develop healthy and sustainable places and communities; and
- Strengthen the role and impact of ill health prevention.

8.2.12 The Marmot Review reported on a substantial body of evidence on the influence the built environment has on the determinants of health. According to the Commission on the Social Determinants of Health, *“Where people live affects their health and chances of leading flourishing lives. Communities and neighbourhoods that ensure access to basic goods, that are socially cohesive, that are designed to promote good physical and psychological wellbeing and that are protective of the natural environment are essential”*.

8.2.13 In turn, the manner in which settlements are planned and designed contributes significantly to the health of the people who live in them. Bad planning and design results in poor health outcomes; conversely, good planning and design can be positively health-enhancing.

Health Equity in England: The Marmot Review 10 Years On (2020)

8.2.14 Health Equity in England: The Marmot Review 10 Years On was produced by the Institute of Health Equity and commissioned by the Health Foundation to mark 10 years on from the landmark study The Marmot Review. The report identified that since 2010:

- people can expect to spend more of their lives in poor health;
- improvements to life expectancy have stalled, and declined for the poorest 10% of women;
- the health gap has grown between wealthy and deprived areas; and
- place matters – living in a deprived area of the North East is worse for your health than living in a similarly deprived area in London, to the extent that life expectancy is nearly five years less.

8.2.15 The report identifies those actions are needed in all six domains set out in The Marmot Review to improve the lives people are able to lead and hence achieve a greater degree of health equity and better health and wellbeing for all. The report also sets out new recommendations in five of these areas, to account for profound changes in health and the social determinants since 2010.

Healthy Urban Planning Checklist (3rd Edition) (2017)

8.2.16 The checklist (London Healthy Urban Development Unit, 2017) (**HUDU Checklist**) aims to promote healthy urban planning by ensuring that the health and wellbeing implications of local plans and major planning applications are consistently taken into account. Although created for London it has many principles that are applicable to any development, particularly where it is residential led.

8.2.17 The checklist is divided into four themes (see **Table 8.1**). Each theme contains a number of questions focussed on a planning issue. Under each theme are related health and wellbeing issues, many of which are identified in local joint strategic needs assessments and health and wellbeing strategies.

Local Policy

Sedgemoor Local Plan 2011-2032

8.2.18 The Local Plan deals with key issues of local importance and gives direction to deliver a high quality of life in a sustainable way. It sets out Sedgemoor District Council's (SDC's) vision, aims and strategy for the borough up to 2032. Planning applications are determined against the policies and proposals of the Local Plan.

8.2.19 The Local Plan acknowledges that while Sedgemoor is not an especially deprived district overall, there are pockets of deprivation. It identifies that a key priority for promoting healthier lifestyle habits among adults, is addressing obesity as a result of low physical activity levels.

8.2.20 The Local Plan includes the following Spatial Vision 'Being Healthy':

"By 2032 the health of the people will have improved as a result of good access to a range of high-quality health care facilities. More people will enjoy healthier lifestyles through sport, recreation and exercise, maximising the benefits of living within or close to a rural environment. Walking or cycling will be the first choice for local trips, encouraged by attractive, safe and convenient district wide green network links. New country parks at South Bridgwater and the Meads and the continued enhancement of Apex Park in Burnham-on-Sea and Highbridge will ensure those living in the towns will have local access to important green spaces."

8.2.21 A number of policies identified in the Local Plan relate to health, wellbeing and social infrastructure for new development, including:

- Policy S2: Spatial Strategy for Sedgemoor
- Policy T2b: Tier 2 Settlements
- Policy CO1: Countryside
- Policy D1: Flood Risk and Surface Water Management
- Policy D2: Promoting High Quality and Inclusive Design
- Policy D3: Sustainability and Energy in Development
- Policy D5: Housing Mix
- Policy D6: Affordable Housing
- Policy D7: Care Homes and Specialist Accommodation
- Policy D13: Sustainable Transport and Movement
- Policy D15: Economic Prosperity
- Policy D24: Pollution Impacts of Development
- Policy D27: Education Provision
- Policy D28: Health and Social Care
- Policy D29: Protection and Enhancement of Existing Green Infrastructure Resources
- Policy D30: Green Infrastructure Requirements in New Developments

- Policy D32: Outdoor Public Recreational Space and New Residential Areas
- Policy D35: Local Services

Puriton Energy Park Supplementary Planning Document (SPD)

- 8.2.22 This SPD, adopted in March 2012, sets out key requirements for the assessment and delivery of the Huntspill (formerly Puriton) Energy Park. As noted in Section 1.3, part of the Site, known as Huntspill Energy Park, received hybrid planning permission in November 2017 (the '2017 Planning Consent'). Regarding health, wellbeing and social infrastructure, it states that *"By being recognised as a regionally significant location for inward investment, the Council is providing local community leadership to meet high level objectives to strengthen the local economy and re-structure employment, skills and the health and well-being of local people."*
- 8.2.23 It also sets out a series of design principles for the Energy Park. Design Principle 4: Sustainability, states that it should create a *"healthy and attractive working environment"* and *"Choose materials to create healthy, comfortable buildings"*.

Bridgwater Vision 2015

- 8.2.24 The Bridgwater Vision, adopted in December 2015, sets out the vision and spatial objectives for Bridgwater. The Vision identified the Gravity Site as a transformational opportunity and acknowledges that *"the development of a high-quality public realm not only improves the aesthetic of the town, but can promote more healthy lifestyles."* It highlights the link between moving people sustainably and better health and wellbeing through active lifestyles, as well as the importance of a local identity, access to decent homes, education and employment, provision of functional green and open space, and need for local services such as health centres and community facilities.

Local Guidance and Strategies

Somerset Joint Strategic Needs Assessment

- 8.2.25 The Joint Strategic Needs Assessment (JSNA) is an assessment of the current and future health and social care needs of the local community. The JSNA informs the Joint Health and Wellbeing Strategy (JHWS) which is a strategy for meeting the needs identified in the JSNA. Local authorities and clinical commissioning groups (CCGs) have equal and joint duties to prepare JSNAs and JHWSs, through the health and wellbeing board established by the local authority.
- 8.2.26 The JSNA (2020) provides baseline data within Somerset for the following topics:
- Behaviour and Lifestyle
 - Conditions and Disease
 - People and Groups
 - Wider Determinants of Health
 - Health and Care Services

Improving Lives Strategy 2019-2028

- 8.2.27 The Improving Lives Strategy 2019-2028 is prepared by the Somerset Health and Wellbeing Board and outlines four strategic priorities for improving health and wellbeing over the ten-year period. These priorities are:

- A county infrastructure that drives productivity, supports economic prosperity and sustainable public services;
- Safe, vibrant and well-balanced communities able to enjoy and benefit from the natural environment;
- Fairer life chances and opportunity for all; and
- Improved health and wellbeing and more people living healthy and independent lives for longer.

8.2.28 Over the ten-year period of the strategy the expected outcomes for health and wellbeing are to increase healthy life expectancy and reduced inequality in life expectancy and healthy life expectancy between communities.

Sedgemoor Health and Wellbeing Strategy

8.2.29 SDC also have a local health and wellbeing strategy which is underpinned by six themes:

- Planning for Sustainable Communities;
- Healthy Housing;
- Economic Independence;
- Healthy Body and Mind;
- Safer Communities; and
- Safer Individuals.

Sedgemoor Infrastructure Delivery Strategy (2017)

8.2.30 The Sedgemoor Infrastructure Delivery Strategy (IDS) provides an assessment of the education, green infrastructure, outdoor sport and recreation and wider infrastructure needs (including healthcare, community and cultural) that has been identified by SDC to support planning development and growth in the Local Plan.

8.2.31 The IDS identifies future demand and delivery for education provision:

- Further investment in education will be required to meet demand associated with growth in Sedgemoor. The residual requirement (2015 – 2032) indicates that development could generate demand across all levels of education provision – up to 978 Early Years Places, 1370 primary school places and 1130 secondary school places.
- In terms of delivery, four school projects have been consented and have funding for delivery: Northgate (primary), Salmon Parade former hospital site (early years), the expansion of Hamp Junior School and Phase 2 of Willowdown Primary School.
- The Submission Version of the Local Plan allocates various areas of land for education and the expansion of existing schools. New primary schools have been allocated at the West Bridgwater and East Bridgwater strategic sites, to be funded by the developers. At West Bridgwater, the potential for a replacement secondary school is cited.

8.2.32 The IDS identifies future demand / delivery of parks, open spaces, sports, and recreation facilities:

- Calculations for demand and costs of sport and recreation facilities directly related to the residual requirement of development (2015 – 2032) indicates demand for a new swimming pool, sports hall, playing pitches, outdoor sports, play space as well as informal and formal open space.
- On-site green infrastructure will continue to be provided by developers in accordance with Policies D32 (Protection and Enhancement of Existing Green Infrastructure Resources) and D33 (Green Infrastructure Requirement in New Development) of the Local Plan.
- Section 106 (s.106) Agreements will continue to be used as the mechanism to deliver on-site provision of outdoor playing space and on-site outdoor sport and recreation facilities. Where provision cannot be provided on-site, off-site green infrastructure will be delivered through CIL in accordance with the Accessible Natural Greenspace Standard (ANGSt) and the Fields in Trust 'Six Acre Standard'.

8.2.33 The IDS identifies improvements and capacity issues relating to healthcare facilities:

- There is demand for improvements to and increased capacity of healthcare provision across Sedgemoor.
- For the strategic allocations in the Local Plan, the Health Impact Assessment would allow the views of the local Clinical Commissioning Group and NHS England to be sought regarding the impact of new development on health infrastructure and/or the demand for healthcare services.
- Where a Proposed Development has a particular impact on the provision of healthcare, s.106 Agreements will continue to be the appropriate mechanism to fill any identified healthcare need or funding gap. In this case, the opportunity to retain and reuse business rates is an alternative mechanism through the investment plan.

8.2.34 The IDS identifies improvements and capacity issues relating to community facilities:

- There is also demand for improvements to and increased capacity of community centres and libraries across Sedgemoor.

Planning Guidance on Space for Sport and Play (2007)

8.2.35 This document sets out the minimum requirements for the provision of public open space and facilities for sport and recreation. It acknowledges that “*such provision as important to individual health and well-being, and to the promotion of sustainable communities*”.

8.3 Consultation

8.3.1 A section was included within the EIA Scoping Report (**Appendix A.X**) submitted to SDC on 29 July 2021 which identified that health and social impacts would be scoped into the EIA and provided a general overview of baseline characteristics, health priorities and proposed methodology. SDC agreed that appropriate human health receptors were identified within the scope of this chapter. SDC's Scoping Opinion was received on 23rd August 2021, and stated the following regarding Health, Wellbeing and Social Impacts:

“The Council is satisfied that appropriate Human Health receptors (nearby residents, construction workers and future residents) and effects have been identified within the scope of Chapter 8 Health, Social and Wellbeing as well as the transport, noise, air quality and water ES topics.

Omissions are noted from the policy table in paragraph 2.8.1:

Health, Social, Wellbeing and Inclusion:

- *Policy S2 Spatial Strategy for Sedgemoor*
- *Policy T2b Tier 2 Settlements – unmet local housing need*
- *Policy CO1 Countryside*

8.3.2 In response to the above, the listed policies have been included in **Section 8.2** above.

8.3.3 Public consultation has been carried out for the Proposed Development which has included the setting up of a project website, community webinars, circulation of e-newsletters to stakeholders and social media (see Consultation Report for further information). Key comments and issues raised by stakeholders have been considered as part of this assessment and referred to in the relevant sections of the assessment.

8.4 Methodology

Study Area

8.4.1 The geographical scope of this assessment includes receptor groups which are likely to be significantly affected by the Proposed Development. The scope of this Chapter is in part dependent upon the study areas identified within other ES Chapters (such as air quality, noise, transport and economics) and the sensitive receptor groups which have been identified within those assessments. Some considerations are relatively localised, such as noise, whereas others, such as economic effects, may affect communities further away from the Site.

8.4.2 Broadly, the study area includes the below geographical areas where appropriate to the health, wellbeing and social impacts being considered. The Site is located predominantly within the ward of Puriton and Woolavington, however the boundary of the Site also extends beyond this ward to the north into the neighbouring ward of Knoll, therefore both wards are within the study area (shown in **Appendix 8.1 – Figure 1**):

- M5 Corridor Function Economic Market Area (FEMA), comprised of Sedgemoor District Council and Taunton Deane District Council;
- Sedgemoor district;
- Ward of Puriton and Woolavington;
- Ward of Knoll; and
- The Lower Super Output Areas (LSOAs) in which the Site is located (Sedgemoor 006B, 006C and 006D).

Baseline Data Collection

Health and Wellbeing

8.4.3 The baseline section of the assessment provides an overview of health and wellbeing characteristics in the study area populations and aims to provide an indication of the distribution of vulnerable groups.

8.4.4 Different sources of information present data at the relevant different geographical scales (as outlined in the 'Study Area' section above). Mapped data relating to vulnerable groups is provided in **Appendix 8.1**.

8.4.5 The following sources of information have been used to develop the baseline characteristics:

- Active Lives Somerset (Sport England, 2020);

- Annual Population Survey (ONS, 2020);
- Annual Survey of Hours and Earnings (ONS, 2020)
- Business Register and Employment Survey (ONS, 2019)
- Somerset Joint Strategic Needs Assessment (Somerset Health and Wellbeing Board, undated):
 - Behaviour and Lifestyle
 - Conditions & Disease
 - People & Groups
 - Wider Determinants of Health
- Improving Lives Strategy 2019-2028 (Somerset Health and Wellbeing Board, undated)
- Sedgemoor District Council Health and Wellbeing Strategy for Sedgemoor 2016-2020 (SDC, undated);
- Consumer Data Research Group maps (Consumer Data Research Group, 2019);
- Office for National Statistics, NOMIS Census Data (NOMIS, 2011);
- Office for National Statistics (2019 and 2020)
- Local Authority Health Profiles (ONS, 2020);
- Local Health Profiles (Public Health England, 2020);
- Population Estimates (ONS, 2019)
- Population Projections (ONS, 2020)
- Relevant baseline from environmental assessments; and
- Outputs of public and stakeholder consultation.

Social Infrastructure

8.4.6 The following sources of information have been used to develop the baseline characteristics:

- Strategic Housing Market Assessment (SDC, 2016) – housing mix and affordable housing;
- Planning Guidance on Space for Sport and Play (SDC, 2007);
- Draft Playing Pitch Strategy (PMP, 2005).
- Sedgemoor Infrastructure Delivery Strategy (IDS) (SDC, 2017)

Future Baseline

8.4.7 In accordance with the methodology set out in the Scoping Report (**Appendix X**), a future baseline has been presented in **Section 8.5** to enable to effects of the LDO against a 'do nothing' scenario which takes into consideration the 2017 Planning Consent (excluding

safeguarded energy land uses), the Gravity Link Road and the Village Enhancement Scheme, approved/allocated developments in the vicinity and likely changes to the natural environment between now and 2032. 2032 has been identified as it is the end of the current Local Plan period and a date by which it is reasonable to assume that the development approved by the LDO will have been delivered.

Sensitive Receptors

- 8.4.8 Receptor groups considered within the assessment are part dependent upon those identified within the contributory assessments (such as air quality, noise, transport and economics) who may be adversely affected or benefitted by the Proposed Development in terms of health and social infrastructure.
- 8.4.9 A review of baseline conditions has identified the following groups as sensitive receptors in relation to health, wellbeing, and social impacts:
- Existing residents surrounding the Site, primarily within the wards of Puriton and Woolavington and Knoll (**Appendix 8.1 Figure 1**);
 - Existing residents in the wider area of Sedgemoor District Council (and Taunton Deane when considering economic impacts), where identified as applicable in other ES Chapters (e.g., economics and transport);
 - New residents of the Proposed Development;
 - New community service users (including users of social infrastructure) likely to use facilities in the Proposed Development;
 - New employees working at the Proposed Development; and
 - Construction workers during the demolition and/ construction of the Proposed Development.
- 8.4.10 The sensitive receptors identified above will cut across communities within sub groups with protected characteristics including age, disability, marriage and civil partnership, race, religion or belief, sex, and sexual orientation.
- 8.4.11 Vulnerable groups within the above receptor group were identified using the WHIASU 'Health Impact Assessment Practical Guide' (2012) Vulnerable/Disadvantaged Groups Checklist and reviewing the JSNA data and baseline data. The following vulnerable groups were identified:
- Older people (65 and over);
 - Children (0-17);
 - Those with a high level of deprivation, low income or unemployment;
 - Those with pre-existing health conditions, such as obesity or mental health issues;
 - New parents or pregnant women; and
 - Vulnerable road users, including pedestrians and cyclists.

Assessment Methodology

- 8.4.12 The approach to this assessment involves a desk-top investigation of health, wellbeing and social impacts. It draws upon other assessments undertaken within the ES, and the approaches used therein. The assessment identifies likely significant effects on relevant

receptors in relation to each health determinant. The Impact Interaction ES Chapter (**Chapter 17**) identifies where potential interactions between effects may occur on the same receptor (e.g., receptors impacted by several health determinants).

- 8.4.13 The established definition of health from the World Health Organisation (WHO) is that “*health is a state of complete physical, social and mental wellbeing and not simply the absence of disease or infirmity*”. This assessment uses the WHO definition of health, recognising that although illness and disease (mortality and morbidity) are useful ways of understanding and measuring health, they need to be taken in the context of a broader understanding of health and wellbeing to be properly useful.
- 8.4.14 The definition of health reflects the understanding that an individual’s inherited traits interact with lifestyle, community, environmental, social and economic factors as well as a much wider range of issues to determine their health outcomes, as shown in **Figure 8.1**.

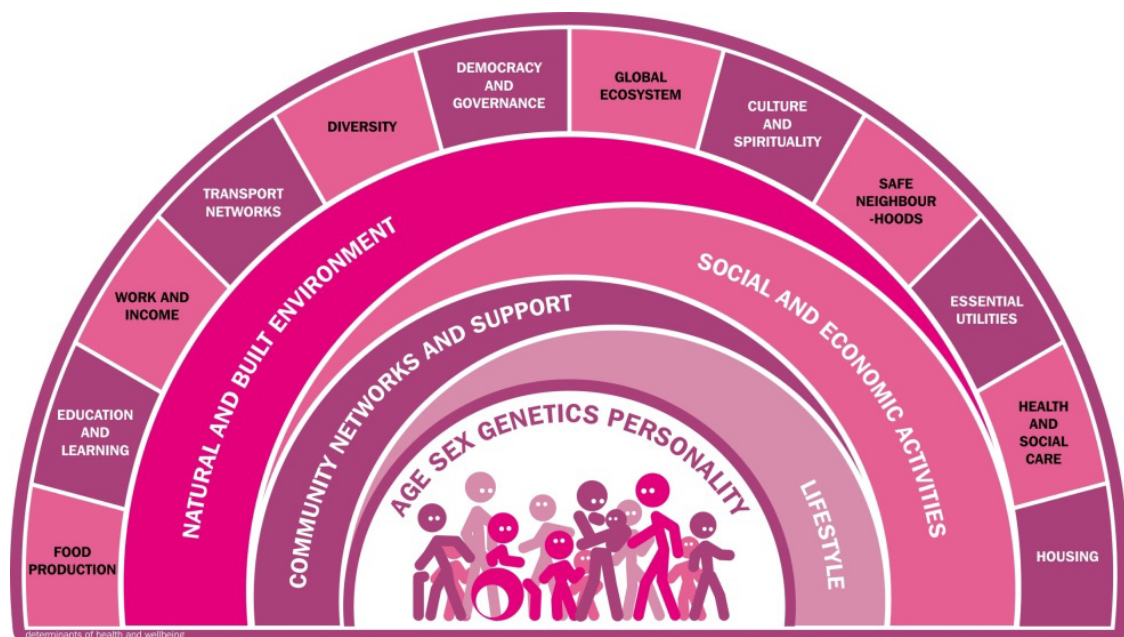


Figure 8.1 The Determinants of Health and Wellbeing (Stantec, adopted from Dahlgreen and Whitehead, 1991⁴)

- 8.4.15 Many of these ‘determinants’ can be influenced by the quality of people’s living and working environments. Therefore, in planning for the Proposed Development it is understood that health is not only concerned with avoiding environmental impacts but also contributing to the factors that improve wellbeing. Planning will include measures to enhance social cohesion, access to jobs, access to affordable housing, access to green infrastructure and access to social infrastructure.
- 8.4.16 The assessment has been undertaken against determinants of health and their relationship to planning issues. The determinants considered are presented within the structure from the NHS HUDU checklist (see **Table 8.1**) and are based on national and local policy and guidance strategies.
- 8.4.17 **Table 8.1** indicates the determinants of health that have been considered in this assessment and the associated pathways to specific health, wellbeing and social outcomes based upon themes in the HUDU planning checklist. By assessing the Proposed Development against these themes, it is possible to identify the beneficial or adverse effect of the Proposed Development on the health and wellbeing of the sensitive receptors and provide a basis for

⁴ Dahlgren G & Whitehead M (1991) Policies and strategies to promote social equity in health. Institute for Future Studies, Stockholm

setting actions for further mitigation and enhancement. Certain issues have been scoped out of the demolition/construction phase assessment (e.g. housing standards) where not considered applicable. Other scoping issues are noted in **Table 8.1**.

8.4.18 The findings of this chapter have drawn on various technical assessments included within the ES of relevance to health, well-being and social factors, including; air quality, noise, ground conditions, water environment, transport and economics.

8.4.19 The assessment undertaken is largely qualitative, except where data is readily available to enable quantification or where quantification of health, wellbeing and social impacts is undertaken in other assessments (e.g., other technical studies in this ES).

Theme	Planning Issue	Health and Wellbeing Issue	Scoping Considerations
Healthy Housing	<ul style="list-style-type: none"> Housing design Accessible housing Healthy living Housing mix and affordability 	<ul style="list-style-type: none"> Lack of living space - overcrowding Unhealthy living environment – daylight, ventilation, noise Excess deaths due to cold / overheating Injuries in the home Mental illness from social isolation and fear of crime 	<ul style="list-style-type: none"> Housing mix and affordability has been scoped out of the demolition/construction assessment when considering the temporary workforce accommodation for up to 200 workers.
Active Travel	<ul style="list-style-type: none"> Promote walking and cycling Safety Connectivity Minimising car use 	<ul style="list-style-type: none"> Physical inactivity, cardiovascular disease and obesity Road and traffic injuries Mental illness from social isolation Noise and air pollution from traffic 	<ul style="list-style-type: none"> Promotion of walking and cycling and minimising car use planning issues have been scoped out of the demolition/construction assessment.
Healthy Environment	<ul style="list-style-type: none"> Construction Air quality Noise Contaminated land Open space Play space Biodiversity Local food growing Flood risk Overheating 	<ul style="list-style-type: none"> Disturbance and stress caused by construction activity Poor air quality - lung and heart disease Disturbance from noisy activities and uses Health risks from toxicity of contaminated land Physical inactivity, cardiovascular disease and obesity Mental health benefits from access to nature and green space and water Opportunities for food growing – active lifestyles, healthy diet and tackling food poverty Excess summer deaths due to overheating 	<ul style="list-style-type: none"> Local food growing has been scoped out of the demolition/ construction assessment. Biodiversity has been considered more broadly as 'access to nature'. Play space and open space are considered together along with physical recreation. It is considered that assessment against these issues, more accurately reflects potential health issues. Overheating has not been explicitly considered as this is a detailed design issue. However, orientation and landscaping should consider this issue as the design progresses.

Theme	Planning Issue	Health and Wellbeing Issue	Scoping Considerations
Vibrant Neighbourhoods	<ul style="list-style-type: none"> Healthcare services Education Access to social infrastructure Local employment and healthy workplaces Access to local food shops Public buildings and spaces 	<ul style="list-style-type: none"> Access to services and health inequalities Mental illness and poor self-esteem associated with unemployment and poverty Limited access to healthy food linked to obesity and related diseases Poor environment leading to physical inactivity Ill health exacerbated through isolation, lack of social contact and fear of crime 	<ul style="list-style-type: none"> Healthy workspaces have not been considered given there is limited information available regarding what the workspaces will be. However, workspace standards should be considered as the design progresses. Access to local food shops is considered together within 'access to social infrastructure'. Public buildings and spaces that are considered within 'access to social infrastructure'.

Table 8.1 HUDU Checklist – Assessment Framework

8.4.20 For ease of reference, the above 'planning issues' are considered to be synonymous with 'health determinants' within this Chapter. The likely significant effects within each health determinant, taking embedded mitigation into account, are considered for both demolition/construction and operational phases, where appropriate, and presented within the impact **Tables 8.4 – 8.10**.

8.4.21 Given the approach as set out above, approved developments (or those considered likely to have been approved and implemented by 2032) are factored into the 2032 baseline, and therefore the assessment of likely significant cumulative effects with these developments is inherent to the assessment and is not reported separately.

Assessment of Significance

Characterisation of Impact

8.4.22 An effect is deemed to be possible where there is a relevant source (aspect of the Proposed Development), pathway (route by which the source affects the receptor - causation) and receptor (recipient that can be affected by the source).

8.4.23 Qualitative judgement is needed where these factors are in place, to establish whether a significant effect is likely. This is related to the strength of the evidence base regarding causation, the magnitude of impact and the sensitivity of the receptors.

8.4.24 Whilst very localised issues may arise and warrant consideration, the key consideration with regard to significance is whether it is likely receptors will experience a change in health, wellbeing and social outcomes and whether this is likely to affect 'population health', as population-based conclusions are the appropriate level at which to consider effects for the purposes of EIA on human health (International Association for Impact Assessment (IAIA), 2019).

8.4.25 The following questions are relevant as noted below:

- Strength of Evidence

- What is the strength of evidence base linking the aspect of the Proposed Development to health, wellbeing and social outcomes? (e.g. through use of Healthy people healthy places evidence tool (Bird *et al.*, 2018));
- Have significant effects been identified in other assessments in the ES which are linked to human health (i.e. are environmental standards threatened) and social impacts?;
- Magnitude of Impact
 - Is the effect at an individual or population level?;
 - Is the impact linked to local public health priority objectives? (as identified through review of baseline sources);
 - Is the impact reversible or irreversible?;
 - Does the impact occur over the short (less than one year), medium (one to five years) or long (over five years) term?;
 - Is the impact permanent or temporary?;
 - Does the impact increase or decrease with time?;
- Sensitivity of Receptors
 - Are vulnerable groups (as identified for this assessment) likely to be affected?

Significance Criteria

- 8.4.26 The IEMA 'Health in Environmental Impact Assessment – A Primer for a Proportionate Approach' (IEMA, 2017) notes the complexities involved in defining significance for population and human health. There is an absence of significance criteria or a defined threshold for determining significance for population and health in UK EIA practice.
- 8.4.27 In addition to this, the IAIA 'Addressing Human Health in Environmental Impact Assessment – Consultation Draft' notes that whilst sensitivity and magnitude are part of determining health significance "...they tend not to capture other information, on importance, desirability and acceptability, that is relevant to presenting a robust 'reasoned conclusion'. For this reason, a simple sensitivity v. magnitude matrix approach is not recommended."
- 8.4.28 This guidance instead states that determination of significance should draw from a wider range of relevant information to support professional judgment including:
- scientific literature;
 - baseline conditions for the population;
 - consultation for the project;
 - health priorities in the jurisdiction;
 - regulatory standards in the jurisdiction; and
 - policy context in the jurisdiction.
- 8.4.29 As such, the typical matrix of determining impact significance in EIAs has therefore not been applied in this health impact assessment. However, the generic significance criteria (noted in

Chapter 5 of the ES) have been considered, taking into account the questions as noted under 'Characterisation of Impact' and drawing on the wider range of relevant information noted above.

- 8.4.30 In accordance with the generic significance criteria, effects that are described as 'minor' or 'negligible' are determined to be 'Not Significant' and effects that are described as 'moderate', or 'major' are determined to be 'Significant'.

Limitations

- 8.4.31 As illustrated in **Figure 8.1**, there are many determinants that can have an impact on an individual's health. It is possible for the Proposed Development to create conditions that could lead to enhanced health outcomes, but there are other factors determining health that cannot be managed by the Proposed Development (e.g. performance of the wider economy and genetic factors).
- 8.4.32 Census and other baseline health data characterises the study area at a single temporal point. Available census data is from 2011, which is likely to have evolved in the last 10 years, more so given the effects of Covid-19. Data is often aggregated at different scales in different sources. For example, census data is aggregated at the lower super output area level but regional and local authority level trends are presented within the JSNA. Therefore, comparisons can be limited.
- 8.4.33 There is a significant amount of literature regarding the evidence base for pathways between aspects of development and health outcomes. In order to provide a proportional assessment, a full literature review is not provided, and the aspects considered in the HUDU Checklist provide the starting point for scoping of relevant determinants of health to be considered. However, a summary of pathways is provided in **Table 8.1**.
- 8.4.34 It should be noted that the focus of this assessment is public, or population level health and individual occupational health and safety issues are not within the remit of this assessment.
- 8.4.35 As noted, this assessment draws upon other assessments undertaken within the ES, and the approaches used therein, and is therefore subject to the limitations of those contributory assessments. Conclusions have been drawn directly from contributory assessments where, for example, quantitative assessment has been undertaken, including noise and air quality.
- 8.4.36 Ambient air quality in the UK is assessed against National Air Quality Strategy Objectives (NAQOs), in which the concentrations against which compliance is assessed are health based, but not completely so. NAQOs also take into account the technical and economic feasibility of achieving them. In contrast, World Health Organisation (WHO) Guideline Values are wholly health based (to protect the most vulnerable individuals in society such as the young and old), and are lower for some pollutants than the NAQOs. The pollutants of particular concern for human health are Particulate Matter (PM)₁₀ and PM_{2.5}, in which the WHO Guideline Values are more stringent than the NAQOs. The air quality assessment in **Chapter 11** has assessed against the relevant NAQOs and been incorporated into the assessment in **Tables 8.4-8.10**. The National Air Quality Assessment uses NAQOs because these are a legal requirement. The Objectives (NAQOs) are set out in the Air Quality Standards Regulations 2010 (and subsequent amendments) which transposes the EU Directive (2008/50/EC) on ambient air quality and cleaner air for Europe and consolidates the Air Quality Regulations 2010 and subsequent amendments. Conversely, the WHO Guideline Values have not been transposed into UK or EU legislation therefore compliance with them is not a legal requirement. Furthermore, best practice prepared by the Institute of Air Quality Management (**IAQM**) and Environmental Protection UK states that when arriving at a planning decision, local authorities should pay particular attention to compliance with the NAQOs when considering air quality.
- 8.4.37 Where relevant, limitation regarding the COVID-19 pandemic on the assessments undertaken for transport, air quality and noise has been set out in their respective chapters.

8.5 Baseline Conditions

- 8.5.1 This section describes the baseline conditions of the study area, which is defined by the area in which the identified sensitive receptors are located. A description of the general characteristics of the local population along with relevant information is present under each of the HUDU Checklist themes (i.e. Healthy Housing, Active Travel, Healthy Environment, Vibration Neighbourhoods).

Current State of the Environment

- 8.5.2 The Site is located within the county of Somerset, within the local authority area of Sedgemoor District Council and within the ward of Puriton and Woolavington and ward of Knoll (see **Appendix 8.1 Figure 1**) The Site is located within the LSOAs of Sedgemoor 006B, 006C and 006D (see **Appendix 8.1 Figure 2**).
- 8.5.3 The Site is currently comprised of 261.54 hectares of land, of which approximately 250 hectares was part of the former Royal Ordnance Factory (ROF) which closed in 2008. The majority of the Site, associated with the ROF, is brownfield, previously developed land which has been incrementally developed over the past 70 years. Land on the edges of the Site, in particular to the south and east, is currently greenfield agricultural land.
- 8.5.4 The area of the Site relating to the former ROF has been remediated in accordance with Condition 10 of the remediation planning permission (ref. 42/11/00017), Remediation verification reports have been prepared by BAE Systems in March 2019, October 2019 and August 2020. It is therefore considered that the Site has been assessed, remediated and verified in accordance with the planning permission and industry best practice (BAE systems, CDM Health and Safety File – Remediation works, November 2020).
- 8.5.5 The Site is surrounded by largely agricultural land to the north, east and west. The village of Puriton lies immediately to the south west of the Site and the village of Woolavington lies immediately to the south east. Beyond Puriton, approximately 2km west of the Site, lies junction 23 of the M5 motorway. The motorway runs in north-south orientation.

Health and Wellbeing

General Health Characteristics and Distribution of Vulnerable Groups

- 8.5.6 Sedgemoor has a greater proportion of people aged 50-90+ than the England and South West region average, particularly within the 50-59 and 70-74 age brackets. Aligned with this, Sedgemoor has a much smaller proportion of people aged between 20 and 44, particularly within the 20-24 age bracket, as shown on **Figure 8.2** below.

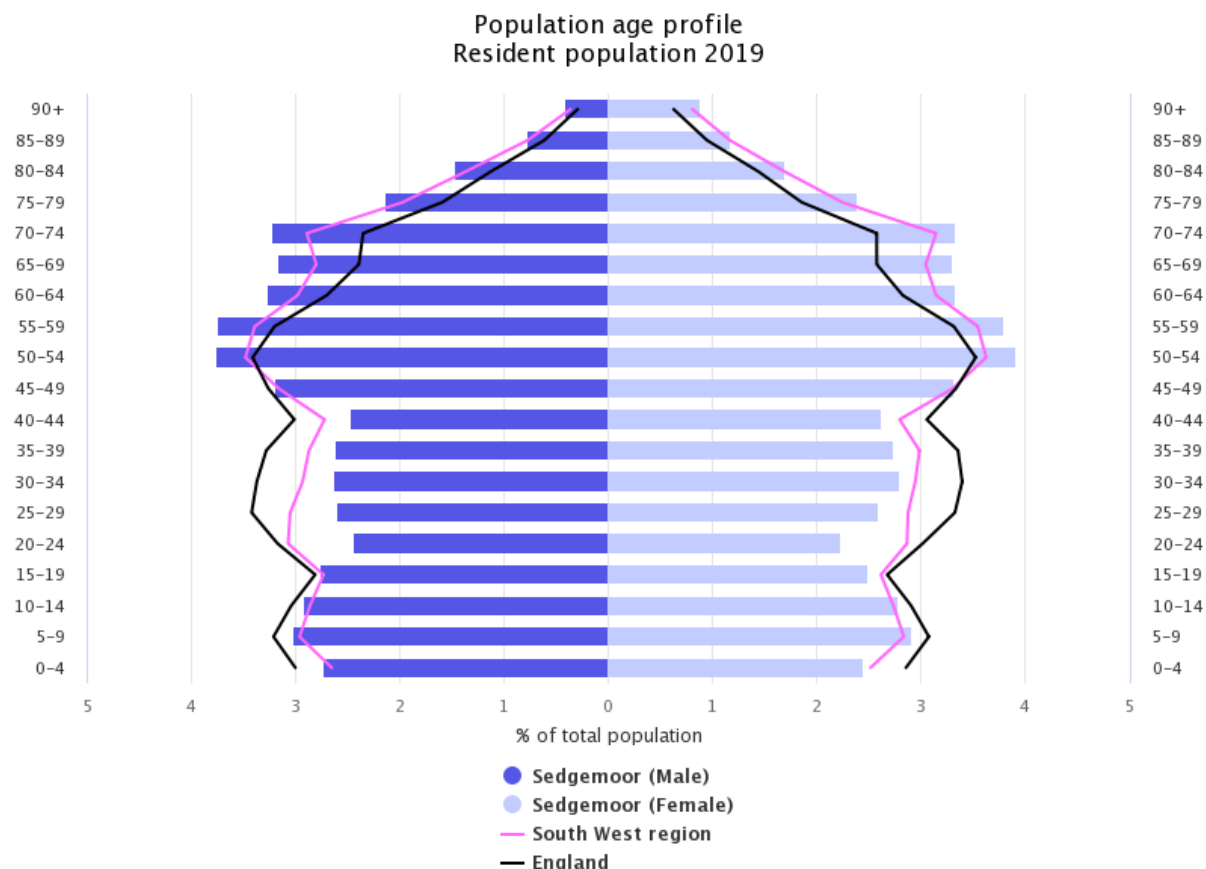


Figure 8.2: Age Profile of Sedgemoor (PHE, 2019)

- 8.5.7 The JSNA (Somerset Health and Wellbeing Board, N.Da) states that over one in four (almost 60,000) households in Somerset contain only residents aged 65 or older in 2014. Almost 4% of those aged 65 or older live in a communal establishment (mainly care homes), but amongst the population aged 85+ the proportion is 16%. It notes that social isolation and loneliness are key factors contributing to health and wellbeing of older people in particular, and that age friendly infrastructure is key to helping older people get out and about and stay connected, which is problematic in rural areas.
- 8.5.8 The age profile for the ward of Puriton and Woolavington shows that there is a slightly lower proportion of people under 16 and of working age than compared to Somerset and England (particularly in the 25-64 age bracket), and higher proportions of older aged people.
- 8.5.9 The age profile for the ward of Knoll shows an age profile more similar to the England average. The % of 16–25-year-olds is higher than that of Puriton and Woolavington, with a slightly higher % of 25–64-year-olds, and lower % of 65+ year olds.
- 8.5.10 A comparison of the age profiles of the ward of Puriton and Woolavington and ward of Knoll with that of Somerset and England is shown on **Figure 8.3** below.

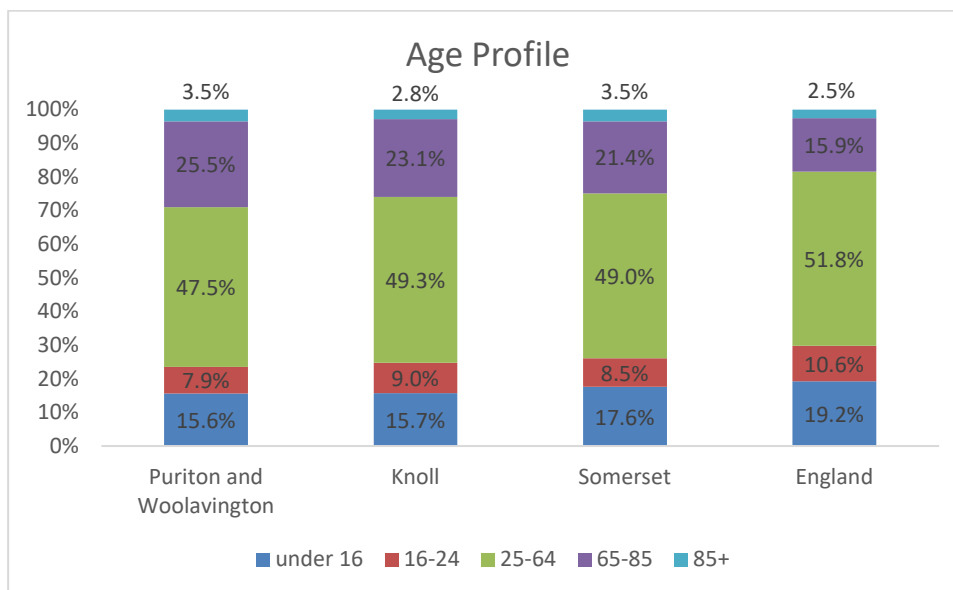


Figure 8.3 Age Profile Comparison

- 8.5.11 The JSNA (Somerset Health and Wellbeing Board, N.Db) summarises the headlines from the 2011 Census with regards to diversity in Somerset, including ethnicity, religion and sexual orientation.
- 8.5.12 94.6% of Somerset's population are 'White British'. This proportion is typical of that seen in Somerset's neighbouring local authorities but much higher than the England and Wales average (80.5%). The Black and Ethnic Minority population of Somerset was estimated at 10,717 in 2011, comprising 2% of Somerset's overall population, which is well below the national average of 14.0%.
- 8.5.13 At the time of the 2011 Census, 346,597 Somerset residents identified themselves as being affiliated to a religion, equating to 65% of the county's population. The main religious groups include: Christian (339,211 residents), Buddhist (1,612 residents), Muslim (1,470 residents), Pagan (1,147 residents), and Hindu (506 residents). A total of 141,071 residents (27%) reported having no religion.
- 8.5.14 The JSNA summarises the findings of several ONS population surveys estimating sexual identity at a local authority level. The estimates suggest that 95.2% of Somerset's adult (aged 16 or over) population identify themselves as heterosexual or straight; 0.9% (4,000 residents) identify as gay or lesbian; 1.1% (5,000 residents) identify as bisexual; and 0.4% (2,000 residents) as 'Other' ('other' indicates that respondents did not consider themselves to fit into the heterosexual or straight, bisexual, gay or lesbian categories). 2.4% of respondents didn't know or refused to answer.

Deprivation, Income and Employment

- 8.5.15 The Indices of Multiple Deprivation (IMD) is a measure of deprivation experienced by people living in an area and is calculated for every LSOA. In relation to deprivation, Somerset has been identified as generally performing better than the national average in terms of overall levels of deprivation. However, since 2015 the number of 'highly deprived' neighbourhoods in Somerset (categorised as being within the 20% most deprived in England) has increased to 29, up from 25 neighbourhoods in 2015 (Somerset Health and Wellbeing Board, N.Dc).
- 8.5.16 The majority of the Site is located within LSOA Sedgemoor 006C (see **Appendix 8 Figure 2**) which is identified as being within the 8th IMD decile (with 1 being the most deprived and 10 being the least deprived). Other parts of the Site are located within the LSOAs of Sedgemoor

006B and 006D which are identified as being with the 4th decile. The scores of each domain of deprivation used to calculate the IMD score for the LSOA are outlined in **Table 8.2** below.

LSOA	IMD Decile	Income Decile	Employment Decile	Education, Skills and Training Decile	Health, Deprivation and Disability Decile	Crime Decile	Barriers to Housing and Services Decile	Living Environment Deprivation
006C	8	8	7	7	6	8	6	5
006B	4	5	5	3	7	6	2	2
006D	4	4	3	3	5	3	9	4

Table 8.2 IMD Scores

- 8.5.17 LSOAs to the north, south and west of the Site similarly sit towards the middle decile and lower end of the rankings with areas of particularly high deprivation being located within urban areas such as Bridgwater and Highbridge.
- 8.5.18 The percentage of children living in low-income families in Sedgemoor is better than the England average, and is decreasing (PHE, 2019). The JSNA (Somerset Health and Wellbeing Board, N.Dd) notes that, of the 110,000 children under the age of 18 living in Somerset, between 5,000 and 10,000 are in particular need, the majority living in the most deprived urban wards in 2016.
- 8.5.19 The health profile (2019) for the ward of Puriton and Woolavington identifies that it performs similar or better than the England average in relation to the percentages of people who experience income deprivation, child poverty and older people in deprivation. At a district level, Puriton and Woolavington perform better than Somerset in relation to child poverty and older people in deprivation.
- 8.5.20 However, compared to the ward of Puriton and Woolavington, the ward of Knoll has less income deprivation (2.3% lower), fewer children in poverty (7.1% lower) and fewer older people in deprivation (1.3% lower). The ward of Knoll is therefore lower than the Somerset and England averages for these indices.
- 8.5.21 A comparison of these indicators are presented in **Table 8.3** below.

Indicators	Puriton and Woolavington	Knoll	Somerset	England
Income Deprivation (%)	10.4	8.1	10.3	12.9
Child Poverty (%)	16.5	9.4	13.6	17.1
Older People in Deprivation (%)	9.2	7.9	10.4	14.2

Table 8.3 Indices of Deprivation Comparison

- 8.5.22 The Business Register and Employment Survey data (ONS, 2019) shows that there were an estimated 52,000 jobs in Sedgemoor in 2019. The sectors supporting the highest levels of employment are:
- Manufacturing (13.5%)
 - Health (9.6%)

- Transport & Storage (9.6%)
- Retail (9.6%)
- Accommodation & Food Services (8.7%)

8.5.23 Within the FEMA there was an estimated 112,000 jobs as of 2019. There are clear similarities between the employment structures of the M5 FEMA and Sedgemoor. The sectors supporting the greatest levels of employment include:

- Health (17.0%)
- Retail (10.7%)
- Manufacturing (9.4%)
- Education (8.5%)
- Accommodation & Food Services (7.6%)

8.5.24 Data from the Annual Survey of Hours and Earnings (ASHE) indicates that the gross median weekly wage for people working in Sedgemoor was £483 in 2020. This represents a marginal increase over the previous year (£482.4). Within the FEMA, the gross median weekly wages have been slightly above what is observed within Sedgemoor alone. Data from ASHE shows that in 2020 the median weekly wage was £497, which is 2.9% above the wages in Sedgemoor.

8.5.25 As outlined in Chapter 7 Economics, the unemployment rate across the M5 Corridor FEMA was 4.0% in 2019, a slight increase over the 2.5% reported in 2018. This rate is above that which was observed in the South West (3.1%) region and also above the national average for the UK (3.9%).

Existing Health Outcomes

8.5.26 The average life expectancy at birth for men and women in Sedgemoor is 80.3 years and 84.0 years respectively, which is similar to, and better than, the England average (79.8 and 83.4 years respectively). Life expectancy at birth for men and women within Puriton and Woolavington is 81.1 years (similar to the England average) and 86.9 years (significantly better than the England average) respectively.

8.5.27 In relation to adult health, Sedgemoor ranges in performance against the England average in relation to a range of indicators. Sedgemoor performs better than the England average with regards to the under 75 mortality rate from all causes, including cardiovascular disease and cancer, killed and seriously injured casualties on England's roads, new STI diagnoses and tuberculosis incidents. It performs similar to the England average with regards to estimated diabetes diagnosis rates, dementia diagnosis rates, admission episodes for alcohol-related conditions and excess winter deaths. However, it performs significantly worse than the England average in relation to suicide rate, emergency hospital admissions for intentional self-harm, hip fractures in people over 65, and smoking prevalence in adults.

8.5.28 The self-reported general health of Sedgemoor, according to the 2011 census, is divided into five categories: very good, good, fair, bad, and very bad as shown in **Figure 8.4**. Sedgemoor has a lower percentage of people describing their health as 'very good' compared to national and south west averages and has a similar percentage of people describing their health as 'bad' or 'very bad'.

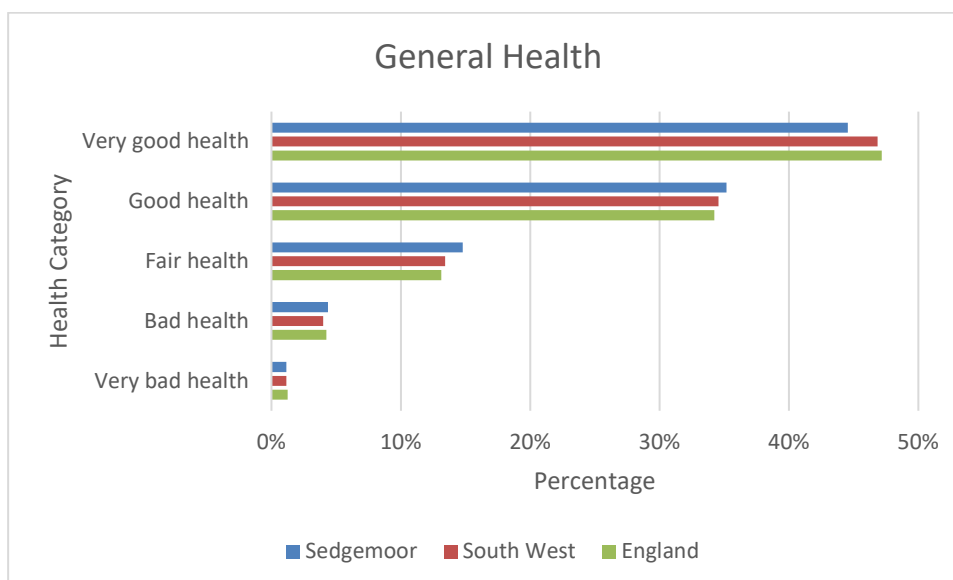


Figure 8.4 General Health (ONS, 2011)

- 8.5.29 In the ward of Puriton and Woolavington, the number of people living with a long-term illness or disability is higher than the England average. Puriton and Woolavington has a lower number of deaths from all causes (all ages and for under 75). The ward has similar numbers to the England average deaths from cancer (all ages and under 75), circulatory disease (all ages), coronary disease, stroke and respiratory diseases, as well as incidences of all cancers, breast cancer, colorectal cancer, lung cancer, prostate cancer, and deaths from causes considered preventable.
- 8.5.30 Comparatively, in the ward of Knoll, the number of people living with a long-term illness or disability is similar to the England average. Knoll has a lower number of deaths from all causes (all ages and under 75), all cancers, respiratory disease and deaths from causes considered preventable, as well as lower incidences of colorectal cancer and lung cancer. It has similar number of deaths from circulatory disease, coronary disease, and stroke, as well as similar rates of all cancers, breast cancer, prostate cancer and hospital stays for self-harm.
- 8.5.31 In relation to child health and development, Sedgemoor is better or similar to the England average on all indicators. The under 18 conception rate is 8.6%, significantly better than the England average of 16.7%. In Sedgemoor, 19.0% of Year 6 (10–11-year-olds) are considered obese or severely obese, which is similar to the England average of 21.0%.
- 8.5.32 The JSNA (Somerset Health and Wellbeing Board, N.De) notes that, according to the Measuring National Well-being programme published by the ONS, Somerset has seen a general improving trend in levels of wellbeing since 2011/12. Around 4 in 10 adults in Somerset rate their 'happiness' very highly (a score of 9 to 10) while around 1 in 13 adults (7%) rate their happiness very low (a score of 0 to 4), with Somerset consistently reporting higher than the national averages for well-being, which may be partially due to the trend that rural areas tend to have higher levels of subjective wellbeing than urban areas.

Healthy Housing

- 8.5.33 As identified in Chapter 7 Economics, the Strategic Housing Market Assessment for Sedgemoor identifies a need for 644 dwellings per annum for the period up to 2032, or a total of 13,530 homes during the period from 2011 up to 2032.
- 8.5.34 Sedgemoor has below average house prices, making it more affordable than other districts within Somerset. However, low average wages mean that home ownership remains challenging despite a lower average house price. The Local Plan notes that a considerable

number of affordable homes have been built since 2006, but the need remains high. There is a particular need identified for starter homes for young people.

- 8.5.35 Fuel poverty is related to low income, high fuel costs and poorly insulated housing. It is linked with excess winter deaths and cold related illness admissions, for example respiratory illnesses (NHS HUDU, 2017).
- 8.5.36 The JSNA (Somerset Health and Wellbeing Board (N.Df) notes that fuel poverty is also particularly prevalent in West Somerset, where an estimated 24,391 households in Somerset are in fuel poverty according to latest figures (for 2016), representing 10.2% of all households. Within Puriton and Woolavington, rates of fuel poverty are similar (10.0%) to the England average (10.3%) However, excess winter deaths in Sedgemoor are worse (23.4%) than the England average (15.1%).
- 8.5.37 The JSNA (Somerset Health and Wellbeing Board (N.Dg) states that the ratio of house price to earnings is greater than the national average in all the Somerset housing authorities, and in West Somerset, house prices at market entry levels are ten times the average earnings figure, making it especially difficult for young people to afford their own homes. It also notes that housing supply remains an issue, especially for one-bedroom properties.

Active Travel

- 8.5.38 As noted in **Chapter 9 Transport and Access**, the footway provision surrounding the Site sometimes lacks consistency with narrow or no footway in places, with one formal crossing point in each village of Puriton and Woolavington. There are no formal cycle paths in the immediate vicinity of Puriton and Woolavington, however National Cycle Network Route (NCNR) 3 runs under the A39 Bath Road adjacent to Woolavington Hill and later connects to NCNR 33, which runs to the east of Woolavington and up into Highbridge. There is currently an absence of formal footways or cycleways adjacent to Woolavington Road.
- 8.5.39 Bus stops through the centre of Puriton and Woolavington are serviced by the 75-bus service from Wells to Bridgwater 7 times a day from 07:45 to 18:27. The 66 and X75 buses operate a singular daily service in each direction. Outside of the immediate vicinity of the Site, additional bus services are accessible from the A38 bus stops at Downend Road and Admirals Table, located approximately 2.5km and 2.8km respectively from the Site. A wider range of bus services are available from Bridgwater Bus Station, which is accessed off Watsons Lane in central Bridgwater. Private school buses operate in the morning and afternoon peaks, servicing secondary schools outside of both Puriton and Woolavington.
- 8.5.40 The closest railway station to the Site is Bridgwater Station, located on the Taunton to Bristol mainline. The station itself is located in Bridgwater town centre on Wellington Road, approximately 7km from the Site.
- 8.5.41 The majority of residents that live in the settlements around the Site, including Puriton and Woolavington travel to work by car or van (CDRC, 2019).
- 8.5.42 In relation to levels of activity, 65% of adults in Somerset identified as being 'Active' - undertaking at least 150 minutes a week, 11% identified as being 'fairly active' - undertaking 30-149 minutes per week and 24% identified as being 'inactive' - less than 30 minutes a week (Sport England, 2021).
- 8.5.43 As noted within Chapter 9, a single PRoW (BW28/2) crosses the Site to the south where the Gravity Link Road which has been implemented as part of the 2017 Planning Consent. The Gravity Link Road crosses the alignment of the public footpath and this has been considered and appropriately incorporated into the Gravity Link Road designs with provision of a new green bridge to retain existing connection.

- 8.5.44 There are several PRow which are in close proximity to the Site, including public footpaths BW 37/2 in Woolavington, BW 28/4 in Puriton, public bridleway BW 28/1 south of the Link Road and restricted byway BW 28/1/1 north of Puriton.

Healthy Environment

- 8.5.45 The majority of the Site (approximately 250 ha) was part of the former ROF and would be classified as brownfield land. The ROF land has been subject to extensive land contamination assessment and remediation as part of the remediation planning consent to reduce the risk of adverse impacts to human health. The Phase 1 Land Condition Report (Ashfield Solutions Group, 2021) assesses the greenfield agricultural land outside of the ROF land. A plan showing the extent of the ROF land is presented within the Phase 1 Land Condition Report (Ashfield Solutions Group, 2021) submitted with this application. This report determined that the overall land contamination risk estimation for this land is Low.
- 8.5.46 The Environment Agency (EA) '*Flood Map for Planning*' shows the majority of the Site lies within Flood Zone 3, with higher elevations towards the south being within Flood Zone 1. There is an intermediary zone between the two shown as Flood Zone 2. The '*Flood Map for Planning*' also indicates that all areas of Flood Zone 3 benefit from flood defences along the Parrett Estuary.
- 8.5.47 The majority of the Site is former ROF land and therefore fenced with no public access. The remainder of the Site (approximately 11 ha) is agricultural, open land. There are ten non-statutory designated sites within or adjacent to the Site, all of which are designated as Local Wildlife Sites, and described in full within Chapter 12 Biodiversity. The nearest statutory designated site is the Huntspill River NNR, which is located immediately to the north of the Site, with a small section (c.0.7ha of a total 148.98ha) within the Site boundary itself. To the south is comprised of open green space and the 37 Club, a local community facility used by residents in Puriton, Woolavington and within the wider area of Somerset as a social and function venue. The 37 Club contains a bar, serves food and offers catering for events. There is a range of sports facilities including skittle alleys, snooker and pool tables, darts, a football pitch and private fishing pond. The nearest children's playground is located in Woolavington adjacent to the Site boundary.
- 8.5.48 As noted in Chapter 11 Air Quality, SDC has not declared any Air Quality Management Areas (AQMAs). There have been no measured exceedances of the annual mean NO₂ concentrations in close proximity to the Site. The nearest monitoring stations to the Site for PM₁₀ or PM_{2.5} emissions are 4 km from the Proposed Development and are therefore not considered representative. However, the estimated background concentrations for the Site provided by Defra suggest that the annual mean background concentrations of NO₂, PM₁₀ or PM_{2.5} are well below the relevant NAQOs.
- 8.5.49 As stated in Chapter 10 Noise and Vibration, the current dominant noise sources are vehicular movements on the surrounding road network, which includes the M5, and vehicular noise from train movements on the Bristol to Exeter railway line to the west of the Site.

Vibrant Neighbourhoods

- 8.5.50 Chapter 9 Transport and Access outlines existing local facilities in the area. Within the vicinity of the villages of Puriton and Woolavington, there is Court Farm Butchers in Puriton, also providing grocery needs and located on Riverton Road, and Co-op Food on Woolavington Hill, with shops providing day to day convenience goods for local residents. The nearest supermarkets to the villages are in Bridgwater, with Budgens situated adjacent to Bristol Road or Sainsburys accessed from The Clink. A post office is also located on Middle Street within the centre of Puriton.
- 8.5.51 There are two GP surgeries within 4 km of the Site. Woolavington Surgery and Edington Surgery form part of the Polden Medical Practice. Bridgwater Community Hospital is located approximately 6km from the Site and offers urgent care and outpatient care. In addition,

Burnham On Sea War Memorial Hospital is located approximately 15km from the Site. The nearest dental facility is 'myDentist' located on Symons Way, Bridgwater, approximately 8 km from the Site.

- 8.5.52 There are two Nurseries School located within 2km of the Site, Hunny Bears Day Nursery and Sunshine Pre-School, both based in Puriton. There are primary schools located in both Puriton and Woolavington. Puriton Primary School is accessed via Rowlands Rise, which contains wide footways on both sides of the carriageway. Woolavington Village Primary School is located on the southern side of Higher Road, has limited car parking facilities and is only served by footways to the east. The closest secondary schools are Chilton Trinity and Bridgwater College Academy, both of which are located within Bridgwater.
- 8.5.1 The National Cycle Network Route extends to the east of Woolavington and north of the Site to Highbridge and is accessible via Cossington Lane. Furthermore, Puriton Sports Centre and the 37 Sports and Social Club can be accessed via Batch Road and Woolavington Road respectively.

Summary

- 8.5.2 Overall, Sedgemoor generally performs better than the national average in terms of overall levels of deprivation. However, there is inequality within this, with the ward of Puriton and Woolavington generally performing worse than the ward of Knoll and Sedgemoor. Key health and wellbeing issues identified for the area include:
- Sedgemoor has an aging population with a greater proportion of people over the working age.
 - There are higher levels of income deprivation, child poverty and older people in deprivation within the ward of Puriton and Woolavington than the ward of Knoll.
 - There are prevalent issues with suicide rates, incidents of self-harm, smoking, alcoholism.
 - Low average wages mean that home ownership remains challenging despite a lower average house price in Somerset. There is a particular need identified for starter homes for young people.
 - Fuel poverty is also prevalent in West Somerset, where an estimated 24,391 households in Somerset are in fuel poverty, representing 10.2% of all households. Within Puriton and Woolavington, rates of fuel poverty are similar (10.0%) to the England average (10.3%) However, excess winter deaths in Sedgemoor are worse (23.4%) than the England average (15.1%).
 - the unemployment rate within the M5 Corridor was 4.0% in 2019, a slight increase over the 2.5% reported in 2018. This rate is above that which was observed in the South West (3.1%) region and also above the national average for the UK (3.9%).

2032 Baseline

- 8.5.1 In 2032, it is assumed that:
- The extant 2017 Planning Consent for Huntspill Energy Park (see [Section 1.3](#) for further details) would have been constructed (excluding land safeguarded for energy uses);
 - The approved Village Enhancement Scheme (see [Section 3.2](#) for further details) would be completed, which includes the provision of a shared footway/cycleway between the villages of Puriton and Woolavington for walkers and cyclists, a mix of traffic calming features and enhanced crossing points between the two villages. This will include two new

permissive paths (which differ from a Public Right of Way (PRoW) as there is no statutory right of access, but the landowner allows the public to use); and

8.5.2 Committed development would have been constructed as per the proposed planning application (**Appendix 1.3**), including the contribution to housing delivery. Whilst it is not possible to accurately characterise the health of the receptor groups at a defined point in time in the future, the following considerations are relevant when assessing the evolution of the baseline:

- Projected trends in health outcomes;
- Success of the strategic programmes for health improvement; and
- Projected changes in demographics including new communities being built.

8.5.3 ONS projections indicate that over the next decade (2020-2030) the population of Sedgemoor will increase by 5.7% to a total of 132,731. This growth will be driven primarily to increases of people who are of pensionable age (+23.4%) with modest estimates for growth of the working age growth (+1%). The population of children is anticipated to decline (-3%) over the same period.

8.5.4 The 2019 Public Health Profile for Sedgemoor identifies that there is a significant increase in emergency hospital admissions for intentional self-harm and admission episodes for alcohol-related conditions, however decreasing rates of under 18s conception and decreasing number of children in low income families.

Health and Climate Change

8.5.5 In October 2020, the Somerset JSNA published a Climate Change and Health note (Somerset Health and Wellbeing Board, 2020) looking at the potential future health impacts of the climate emergency. The key findings were:

- Extreme conditions – heat, cold, floods and droughts – have the greatest adverse impacts on health.
- The risks associated with heatwaves are likely to increase considerably by the second half of the 21st century.
- The risks associated with cold snaps (and impact on ‘winter pressures’) are likely to be lowered by the effects of global warming.
- The most vulnerable in heatwaves are people with circulatory and respiratory conditions; this group may, though, benefit from reduction in winter cold.
- People in poor housing will continue to have poor health outcomes associated with heat and cold.
- The risks associated with flooding will rise. This will be particularly in the ‘usual’ flood zones (such as the lowland moors and low-lying coastal areas) and the ‘rapid rise catchments’ vulnerable to flash flooding, but no areas are exempt. The biggest health impact is mental.
- Flooding will affect provision of services, notably home-based social care.
- The risk of Lyme disease is likely to rise, as may West Nile virus.

- Longer term effects, within Somerset but probably to a greater extent in the poorer and environmentally marginal parts of the world, may have economic and social consequences with highly unpredictable and almost certainly harmful results.

8.6 Embedded Mitigation

Demolition/ Construction

- 8.6.1 A Framework Demolition/Construction and Environmental Management Plan (FDCEMP) has been submitted as part of this LDO (**Appendix 4.1**). The assessment identifies, within **Tables 8.4-8.10**, where specific measures within the FDCEMP are relevant to mitigate for potential health effects e.g. in relation to dust and noise. This is secured within the Compliance Form.

Operation

- 8.6.2 A Clean and Inclusive Growth Strategy (2020) has been prepared which sets out an ambitious vision for Gravity to deliver a socially inclusive development that considers health and wellbeing at its heart. An Environmental and Social Governance (ESG) policy has also been developed to ensure reporting requirements are threaded through the LDO processes, and to ensure that a standard is set for occupiers to have ESG. A Design Guide has also been prepared which sets out the design and placemaking principles.
- 8.6.3 Mitigation, which has been embedded into the development parameters and relied upon as part of this assessment, includes:
- Provision of up to 750 residential units;
 - A proportion of homes to be wheelchair accessible or adaptable in accordance with local policy;
 - Creation of a smart campus, which will provide up to 1,000,00 sqm of industrial, commercial and employment floorspace;
 - Provision of leisure and support facilities, including up to 100,000 sqm of sport and leisure facilities, restaurants, cafes, shops, and a hotel;
 - Provision of educational facilities, including a nursery and potentially training facilities aligned to business needs and to comply with the spirit of the employment and skills plans; and
 - As demonstrated on the Landscape Parameter Plan, there will be provision of public open space and natural green space, including the Gravity Park, within the Wellbeing and Arrival Zone, and other formal and informal spaces. Play space will be provided, and all homes will be within a 5-minute walk of a play area.
 - Transport proposals set out in the Transport Movement Strategic Masterplan which includes provision of dedicated footway and safe pedestrian routes, high quality cycling provision, provision of off-site cycle route improvements and improved connections to local bus routes.

8.7 Assessment of Likely Effects

- 8.7.1 This section sets out the predicted impacts and subsequent likely significant effects arising from the demolition/construction and occupation of the Proposed Development on human health as described in this chapter. The assessment considers the embedded mitigation, as described above.

Demolition/ Construction Effects

- 8.7.2 **Table 8.4 – 8.6** summarise the assessment of significant effects to human health, wellbeing and social impacts from the demolition/ construction phase of the Proposed Development. Some of the health determinants categories are only applicable to the operation of the Proposed Development (e.g., Housing Design) and therefore have not been considered within the construction assessment.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Housing design, accessible housing, healthy living.	Up to 200 workers will require temporary workforce accommodation during the demolition/construction phase. Although there is currently no available information regarding the specific details of the temporary accommodation, it will be provided in accordance with the prevailing legal requirements for healthy and safe accommodation.	<u>Receptor Groups:</u> <ul style="list-style-type: none"> Construction workforce <u>Vulnerable Groups:</u> <ul style="list-style-type: none"> None identified 	Negligible	Implementation of best practice standards for temporary worker accommodation.

Table 8.4 The assessment of the effects on the Healthy Housing health determinant from the demolition/construction of the Proposed Development

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Safety	<p>Chapter 9 Transport identifies that HGV movements will be limited to the Gravity Link Road, the A39 Puriton Hill, M5 junction 23 and mainline. The chapter notes that these links do not have sensitive receptors present. It also identifies that the Gravity Link Road will be operational prior to development, and therefore construction traffic will not be routed through Puriton or other links with adjacent sensitive receptors, mitigating any potential for effects to arise in relation to fear and intimidation.</p> <p>Additionally, the Village Enhancement Scheme will deliver improvements for pedestrians and cycle movements across the local network, as well as traffic calming measures. This will encourage pedestrians and cyclists to utilise the safe and sustainable connections between the villages of Puriton and Woolavington.</p> <p>A Framework Construction Traffic Management Plan (CTMP) is included in the FDCEMP, which will manage impacts from construction traffic, including safety.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents adjacent to the Site boundaries and those within the area immediately surrounding the Site Existing community service users – PRoW New residents of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> Vulnerable road users, including pedestrians and cyclists Older people (65 and over) Children (0-17) 	Negligible	No additional mitigation identified.
Connectivity	<p>One ProW currently crosses at the south of the Site where the Gravity Link Road has been constructed, however the Link Road has now been implemented and a new green bridge provided to retain the existing connection. As noted in Chapter 14, there are two existing tracks within the Site area (one leading to Crockers Hill in Woolavington and a second leading from Rookery Close in Puriton), which are not designated.</p> <p>It is anticipated that there would be no disruption to access to ProW to facilitate the construction works, however, there may be some temporary disruption to two permissive paths linking to Puriton and Woolavington during the construction</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents in the wider area of Sedgemoor Existing community service users – ProW/ cycleways New residents of the Proposed Development 	Negligible	No additional mitigation identified.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>stage, and the permissive pathways associated with the approved Village Enhancement Scheme.</p> <p>Effects may arise in relation to severance as a result of these construction traffic impacts, however these will be mitigated by the delivery of the Gravity Link Road being operational prior to development, and therefore construction traffic will not be routed through Puriton or other links with adjacent sensitive receptors. The Framework CTMP included in the FDCEMP will also consider any potential severance concerns.</p>	<p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 		

Table 8.5 The assessment of the effects on the Active Travel health determinant from the demolition/construction of the Proposed Development

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Air Quality	<p>Chapter 11 Air Quality identifies that there is potential for dust emissions during the demolition/construction phase. It identifies that the risk of construction dust impacts on human health are ‘medium’ for all activities including demolition, earthworks, construction and trackout. Dust mitigation measures have been included in the FDCEMP and will be implemented during the demolition and construction phase to see that effects are not significant.</p> <p>The chapter identifies that, during the construction period, the increase in heavy duty vehicles (HDVs) movements on the road network will be below the threshold of 100 movements per day outside an Air Quality Management Area (AQMA). The maximum increase in HDV movements is 54 per day, the construction traffic impacts on human health receptors in the area are likely to be insignificant.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents located adjacent to the Site boundaries and those within the area immediately surrounding the Site New residents of the Proposed Development Site construction employees New users of the Proposed Development (prior to completion of construction) <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	Negligible (as per terminology used in Air Quality ES Chapter)	No further mitigation identified.
Noise	<p>Chapter 10 Noise and Vibration identifies that demolition and construction noise could potentially increase the ambient noise levels at existing and proposed noise sensitive receptors.</p> <p>Noise sensitive receptors have been positioned in the south of the Proposed Development in the vicinity of existing noise sensitive receptors, to reduce impacts on existing environmental noise sources (specifically the railway and M5). Additionally, the reinstated railway line and extension is positioned to the north west of the Site away from proposed and existing noise sensitive receptors to allow the proposed commercial and industrial structures to provide acoustic screening.</p> <p>It is anticipated that noise impacts will range from negligible to minor for existing and proposed noise sensitive receptors as a result of construction activity. Noise and vibration</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents located adjacent to the Site boundaries and those within the area immediately surrounding the Site New residents of the Proposed Development (prior to completion of construction) <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	<p>Impacts from construction activity – minor adverse</p> <p>Impacts from construction traffic – negligible</p> <p>Impacts from construction vibration – minor adverse</p>	No further mitigation identified.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>mitigation measures have been set out in the chapter and included in the FDCEMP, and therefore effects are anticipated to be not significant.</p> <p>Noise generated from construction traffic is anticipated to be negligible and therefore not significant.</p> <p>The closest existing vibration sensitive receptors are likely to be approximately 30 m away from the closest demolition and construction works occurring on Site. It is anticipated that vibration levels as a result of auger piling are therefore likely to have a negligible impact.</p>			
Contaminated Land	<p>As stated in Section 2.3, the area of the Site relating to the former ROF has been remediated in accordance with Condition 10 of the remediation planning permission. The Phase 1 Land Conditions Report (Ashfield Solutions Group, 2021) identified the potential for land contamination hazards uses within the greenfield portion of the Site (see Phase 1 Land Condition Report for Plan showing extent of greenfield area) to be very low.</p> <p>The Phase 1 Land Condition Report assessed ground conditions with awareness that land uses for this area are likely to comprise a mix of residential, leisure, sport and community uses. With regards to human health, it noted low potential for ingestion, inhalation and/or dermal contact from contaminated soil and dust, low potential for adverse human health impacts via ingestion of vegetables and soils attached to home grown produce in future residential areas across majority of site, with low to moderate potential on land immediately adjacent of the ROF approach roads where made ground is present. However, the Land Condition Report did not highlight any specific land contamination sources requiring further investigation and recommends that a “watching brief” should be implemented during future earthworks, particularly during the clearance of the former</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents surrounding the Site Construction workers during the construction of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> No specific groups identified 	<p>Negligible in former ROF land</p> <p>Minor Adverse – Negligible in greenfield site</p>	<p>Measures set out in the Phase 1 Land Conditions Report (e.g. implementation of a watching brief during earthworks) to be implemented</p>

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>ROF buildings and associated foundations in the vicinity of the ROF approach roads.</p> <p>There is low potential for permeation of potable water supplies by hazardous substances, and negligible potential for inhalation of vapours from contaminated soils or groundwater based upon absence of historical sources of volatile contamination.</p> <p>However, there is moderate potential for migration of gases (radon & natural ground gas) from natural strata via unsaturated zone and services. The Phase 1 report recommends that all properties will be required to incorporate radon protection measures.</p> <p>To mitigate the potential adverse effects to human health during construction, the FDCEMP sets out incident control procedures which the Principal Contractor should follow, which will help to reduce the risk of adverse impacts to human health.</p>			
Playspace, open space and physical recreation	<p>There are no existing play spaces located on Site and limited publicly accessible open space, due to the majority of the Site being part of the former ROF and fenced off from the public. The remainder of the Site (approximately 11 ha) is agricultural land which is open, accessible land. As noted above, access to ProW is anticipated to be maintained throughout the construction period.</p> <p>Access to the 37 Club and its environs will be disrupted during demolition/ construction as the building is demolished, and a replacement facility provided. A new facility will be provided prior to the demolition of the existing facility. There will be ongoing communications with the 37 Club to identify suitable mitigation measures until a new facility is provided, as outlined in the FDCEMP.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents surrounding the Site Existing users of the Site – the 2 undesignated tracks and permissive pathways provided as part of the Village Enhancement Scheme Existing community service users – 37 club New residents of the Proposed Development 	Minor adverse	None identified.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
		<u>Vulnerable Groups:</u> <ul style="list-style-type: none"> No specific groups identified 		
Access to Nature	<p>The majority of the Site is currently not accessible to the public as it is former ROF land and therefore fenced off. In addition, the Local Wildlife Sites (LWS) on or adjacent to the Gravity Site are not currently accessible to the public as they are on former ROF land or on private property. The remainder of the Site is agricultural land with open access. This includes the 37 Club and its environs along the southern boundary of the Site, and the ProW which runs adjacent to the Gravity Link Road.</p> <p>As noted above, access to the 37 Club and its environs will be disrupted during demolition and construction of a new facility. Access to the ProW to the south of the Site will not be impacted during construction.</p> <p>During the demolition and construction phase, there may be adverse effects to species and habitats including through direct loss of habitat and disturbance to wildlife.</p> <p>The FDCEMP aims to avoid adverse effects on retained features, such as through pollution prevention, prevention of encroachment of construction works onto retained habitat of value (including designated sites) and the control of noise and light disturbance on retained features such as badger setts or bat roosts.</p> <p>The strategic landscape parameters plan shows the green space, landscape corridors that include lines of trees and rhynes, the indicative extents of structural and woodland planting and amenity spaces to be provided as part of the</p>	<u>Receptor Groups:</u> <ul style="list-style-type: none"> Existing residents in the wider area of Sedgemoor Existing users of the Site – 37 Club New residents of the Proposed Development (prior to completion of construction) <u>Vulnerable Groups:</u> <ul style="list-style-type: none"> Groups with pre-existing health conditions (e.g., mobility impairment) New parents 	Minor Adverse	Further mitigation to be implemented as outlined in Chapter 12 Biodiversity (e.g. An Ecological Mitigation and Enhancement Strategy (EMES) will be prepared for the Site and secured through the Mitigation Checklist in the Design Guide).

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>Proposed Development. This can be utilised to deliver a diverse and interconnected matrix of habitat types of ecological value.</p> <p>Whilst some localised effects on specific ecological features are anticipated, the key point of relevance to human health is whether access to nature is affected. As there is currently limited access to the nature on Site, including the LWSs, it is therefore not anticipated to be any change to access during construction.</p>			
Flood Risk	<p>There is the potential for temporary minor adverse impacts as a result of increased surface water run off rates. However, the FDCEMP sets out the embedded mitigation measures to help see that effects will be negligible.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residential and commercial development located adjacent to the Site boundaries and those within the area immediately surrounding the Site (located upstream and downstream); Construction workers during the construction of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> No specific groups identified 	Negligible	<p>During construction, the use of best practice construction techniques (such as CIRIA publication C753 the SuDS Manual) and the implementation of the FDCEMP will be adopted to manage the construction process, minimise the risk of a pollution incident, silt-laden runoff, or blockage of channels during the construction works.</p> <p>The FDCEMP will include a Flood Evacuation Plan and a suitable drainage scheme to control surface water runoff during the Proposed Development construction phase, including provision for the installation of drainage and attenuation outfalls before construction of buildings and site infrastructure.</p>

Table 8.6 The assessment of the effects on the Healthy Environment health determinant from the demolition/construction of the Proposed Development

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Healthcare Services	<p>There are currently no healthcare services on the Site which would be affected by demolition/ construction activities.</p> <p>There is potential for additional demand to be placed on existing healthcare services as a result of an increase in construction workers in the area. However, Chapter 7 Economics notes that the construction labour force currently engaged with the development of Hinkley Point C will be retained and redeployed to the Gravity site where possible. This will help to dilute any new impacts on existing services.</p>	<p><u>Receptor Group:</u></p> <ul style="list-style-type: none"> Existing residents in the wider area of Sedgemoor <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	Minor Adverse	No further mitigation identified.
Education	<p>There is potential for skills accumulation and training during construction for surrounding residents of the Site and within the wider area of Somerset.</p> <p>A Skills Charter has been prepared which sets out high level principles and objectives for the Proposed Development. Parcel/occupier specific Employment and Skills Plans will be developed with the Principal Contractor, which will seek to optimise inclusion in skills enhancement and integration into the community, working with the local Bridgwater and Taunton College. Measures include a targeted recruitment and training campaign to guarantee job interviews for local unemployed residents who have undertaken specific pre-employment training related to the Proposed Development.</p>	<p><u>Receptor Group:</u></p> <ul style="list-style-type: none"> Existing residents in the wider area of Sedgemoor <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> Children (0-17) Those with a high level of deprivation, low income or unemployment 	Moderate Beneficial	Implementation of Employment and Skills Plan by Principal Contractor.
Local Employment and Healthy Workplaces	Chapter 7 Economics identifies that the construction of the Proposed Development will support 10,800 gross person years equivalent (PYE) ⁵ . Due to the mobility of labour, competition from externally located construction firms and supply chains, it is estimated	<p><u>Receptor Group:</u></p> <ul style="list-style-type: none"> Existing residents in the wider area of Somerset 	Major Beneficial	Implementation of occupier specific Employment Skills Plans to help deliver economic benefits to

⁵ Person Year Equivalents (PYE), i.e. the number of full-time jobs which could be supported for a single year based on the capital expenditure

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>that 3,525 net construction jobs will be generated. This is anticipated to have a Major Beneficial effect on the M3 Corridor Functional Economic Market Area, which includes Sedgemoor.</p> <p>The Gravity Skills Charter (2021) sets out the high-level principles and objectives for future parcel / occupier specific Employment and Skills Plans, which will be developed to deliver benefits to the local community, Gravity, and its occupiers. It will help shape the local labour force to meet industry and market requirements and help residents to understand the training opportunities available to them at Gravity.</p> <p>This will also result in the creation of higher value, sustained (permanent) job opportunities as a transition opportunity from the temporary roles at Hinkley Point C.</p>	<p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> ■ Those with a high level of deprivation, low income, or unemployment 		the local population during the demolition/ construction phase.
Access to Social Infrastructure	<p>The Consultation Report outlines the extensive engagement process that has been undertaken and details the feedback received. Concerns were raised with regards to accessing the 37 Club. There is potential for disruption to this service during demolition/construction of the current facility and the opening of a new facility, however a new facility will be provided prior to the demolition of the existing facility so access to this facility is anticipated to be limited.</p> <p>A FDCEMP has been prepared and submitted with the LDO which includes measures on communication with local residents, and this will communication with the 37 Club. Information will be provided to local residents and communities through relevant communication channels such as letter drops, notices on Site hoardings, website communications, electronic and</p>	<p><u>Receptor Group:</u></p> <ul style="list-style-type: none"> ■ Existing community services users – 37 Club ■ New community service users – 37 Club <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> ■ All vulnerable groups identified 	Minor Adverse	No additional mitigation identified.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>community (hard copy) newsletters, adverts in the local press etc.</p> <p>During the preparation and implementation of the detailed CEMPs for each phase and the appointment of principle contractors, CEMPs will be updated to include how comments and complaints can be made and associated contact details.</p>			

Table 8.7 The assessment of the effects on the Vibrant Neighbourhoods health determinant from the demolition/construction of the Proposed Development

Operation Effects

8.7.3 **Tables 8.8-8.11** summarise the assessment of significant effects to human health from the completed development.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Housing Design / Accessible Housing / Healthy Living	<p>Given that the LDO is parameter based, detailed information on the design of residential units is not currently available, however a proportion of homes will be wheelchair accessible or adaptable in accordance with local policy.</p> <p>As identified in the Energy Strategy (Stantec, 2021), housing will incorporate a range of measures to be implemented to help increase energy efficiency, including:</p> <ul style="list-style-type: none"> implementing a fabric first approach, using high insulation levels to reduce energy demand and reliance on mechanical solutions provision of a comprehensive green infrastructure network to facilitate air movement and enhance natural ventilation orient buildings where appropriate to take advantage of south facing aspects for winter passive solar gains <p>The inclusion of these measures will help reduce the amount of energy that residents use, helping reduce household expenditure on bills and fuel poverty.</p>	<p><u>Receptors Groups:</u></p> <ul style="list-style-type: none"> New Residents <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> Older people (65 and over) Children (0-17) New parents or pregnant women Groups with pre-existing health conditions 	Minor Beneficial	Housing standards to be considered throughout detailed design including Building Regulations (M4), wheelchair accessibility and energy efficiency standards.
Housing Mix and affordability	<p>The Proposed Development will provide up to 750 private housing. It is assumed the majority of residential dwellings will be occupied by employees of the Proposed Development. As these residential units will not be open market homes, they will ensure the Site makes a meaningful contribution to supporting</p>	<p><u>Receptors Groups:</u></p> <ul style="list-style-type: none"> New Residents 	Minor Beneficial	Consideration to be given to a balanced and appropriate mix of house types at future planning and design stages to see that this best meets

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	employees living locally and reduce the pressure on the local housing demand generated by new employees working at the Site.	<u>Vulnerable Groups:</u> <ul style="list-style-type: none"> No specific groups identified. 		the needs of the future workforce and their families.

Table 8.8 The assessment of the effects on the Healthy Housing health determinant from the Proposed Development during operation

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Walking and Cycling	<p>Chapter 9 Transport and Access sets out the extensive strategic transport proposals which incorporates measures to facilitate and promote walking and cycling, including:</p> <ul style="list-style-type: none"> improved access and choice for pedestrians, including streets to have a minimum of a dedicated footway and safe pedestrian routes throughout the Proposed Development; streets to incorporate high quality cycling provision (segregated where possible) to facilitate and encourage trips by bike; provision of accessible, safe, secure and sheltered cycle parking facilities at key destinations throughout the Site; provision of cycle equipment storage, maintenance, changing and shower areas across the Site in appropriate areas; and provision of off-site cycle route improvements as part of the Gravity Link Road and the VES. 	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents adjacent to the Site boundaries and those within the area immediately surrounding the Site New community service users (footpaths and cycleways) New residents of the Proposed Development New users of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	Major Beneficial	No further mitigation proposed.
Safety	<p>No material road safety issues were identified within the Transport Assessment, and it is therefore anticipated that effects will be not significant.</p> <p>Within the Proposed Development, streets will be designed to provide appropriate pedestrian and cycle routes to provide safe routes throughout the development.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents adjacent to the Site boundaries and those within the area immediately surrounding the Site New community service users (footpaths and cycleways) New residents of the Proposed Development 	Negligible	The package of transport mitigation remains subject to further consultation with key stakeholders, who may include additional mitigation by way of appropriately scaled financial contributions toward delivery of off-site transport improvements highway safety improvements where necessary.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
		<ul style="list-style-type: none"> New users of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> Vulnerable road users, including pedestrians and cyclists Older people (65 and over) Children (0-17) 		
Connectivity	<p>As outlined in Chapter 9 Transport and Access, the Transport Movement Strategic and Transport Movement Micromobility Parameter Plans in Appendices 3.1b & c illustrate the principal proposals to be delivered to support access and movement into and around the Proposed Development within the Site. This includes potential secondary access locations, with up to four secondary access locations proposed from Woolavington Road to provide potential access to development plots incorporating new points of access to the south-west and south-east of the Site and re-use of the existing site Eastern and Western approach access junctions.</p> <p>External bus routes will be able to enter the Site via the new access road, and in the early phases, an electric / alternative fuel bus loop will distribute people around the Site in an expedient manner.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> New residents of the Proposed Development New users of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	Major beneficial	No further mitigation proposed.
Minimising Car Use	As outlined in Chapter 9 Transport and Access, the Proposed Development has sought to reduce the need to travel. Flexible or remote working practices and technological solutions including video conferencing	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> New residents of the Proposed Development 	Major beneficial	No further mitigation proposed.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>and online collaboration will be available to employees where possible.</p> <p>Additionally, up to 750 residential units are to be delivered that are intended to primarily serve as housing for employees at the Site.</p> <p>The campus will include work hubs which will help to further reduce the overall need to travel off the Site for some trip purposes.</p> <p>As set out above, an extensive footway and cycleway will be provided to help facilitate active travel.</p>	<ul style="list-style-type: none"> ■ New users of the Proposed Development ■ Vulnerable Groups: <ul style="list-style-type: none"> ■ Older people (65 and over) ■ Children (aged 0-17) ■ Those with a high level of deprivation, low income or unemployment ■ Groups with pre-existing health conditions 		

Table 8.9 The assessment of the effects on the Active Travel health determinant from the Proposed Development during operation.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Air Quality	<p>Chapter 11 Air Quality identifies that operational road traffic impacts on all human receptors will be negligible.</p> <p>It is anticipated that impacts as a result emissions from the energy plant and industrial plant will be not significant. The chapter notes that higher emission rates are likely to be acceptable but will need to be considered through the Design Guide.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents within the area immediately surrounding the Site New residents of the Proposed Development New community service users <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	Negligible for all potential impacts	No further mitigation required.
Noise	<p>Chapter 10 Noise and Vibration identifies that, in the absence of mitigation, external noise levels is anticipated to be moderate adverse effect to proposed receptors. A series of mitigation is proposed to shield external amenity areas from the noise sources.</p> <p>It is anticipated that, based on the road traffic noise assessment, the change in ambient levels for existing receptors will be minor to negligible.</p> <p>It is anticipated that noise from the proposed rail infrastructure is likely to have a low impact at all existing and proposed noise sensitive receptors during both the daytime and the night-time, and is therefore considered to have a negligible impact.</p> <p>There is potential for noise impacts on nearby noise receptors as a result of fixed plant and equipment noise. The assessment concluded that the impact is likely to be negligible.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents within the area immediately surrounding the Site New residents of the Proposed Development New community service users <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	<p>External noise levels (proposed receptors) – minor</p> <p>Change in ambient levels (existing receptors) – minor to negligible</p> <p>Noise from rail proposals – negligible</p> <p>Plant noise – negligible</p>	Mitigation set out in Chapter 10 to control noise impacts (e.g. implementing a noise strategy, use of acoustic double glazing at properties directly adjacent to roads etc.) to be implemented.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Contaminated Land	<p>It is anticipated that the mitigation measures for ground contamination will be implemented during construction to help reduce adverse effects on human receptors. These have been outlined in Table 8.6 above.</p> <p>The former ROF land has undergone extensive remediation as part of the remediation planning application. As the Proposed Development is market led, the future occupiers of the industrial and commercial land uses on site are not yet known.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents surrounding the Site; New residents and users of the Site. <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All specific groups identified 	<p>Negligible effect on the former ROF land</p> <p>Minor adverse on the greenfield site.</p>	<p>Recommendations outlined in the Phase 1 Land Condition Report (e.g. further assessment, agreeing building radon protection with Building Control) to be implemented.</p>
Play space, open space and physical recreation	<p>As shown on the Strategic Landscape Parameter Plan, landscaping and open spaces will be provided across the Site including Gravity Park, the Wellbeing and Arrival Zone, an east-west landscape corridor, and structural tree and woodland planting.</p> <p>Local Equipped Area for Play (LEAP), Neighbourhood Equipped Area for Play (NEAP) and Local Area for Play (LAP) will be provided to provide play facilities for a range of ages, with details to be provided at detailed design, aligned to Gravity Park or the replacement of the 37 club. Play provision will be supplemented by opportunities for self-led wilderness play using informal and semi natural open spaces.</p> <p>Up to 100,000 sqm of local and community facilities will be provided, which will include sport and leisure facilities for the workforce.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> New residents of the Proposed Development New community service users – 37 Club <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> No specific identified 	<p>Moderate beneficial</p>	<p>At the detailed design stage, consideration should be given to see that play spaces, allotments and picnic areas are incorporated into open spaces to encourage outdoor exercise and social interaction.</p> <p>Sports England's 10 principles of active design should also be considered during the detailed design of open space, play space and sports facilities (e.g. mix of sport/ play facilities provided, seating and secure cycle parking provided in public spaces).</p> <p>Management procedures for facilities (including pitches) should be put in place to see that facilities are maintained appropriately to help support physical activity. Measures</p>

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
				should be implemented to help promote uptake of physical activity (e.g. programme of events, use of social media and identification of local champions).
Access to Nature	<p>As outlined in Chapter 12 Biodiversity, there may be beneficial and neutral effects to habitats and species during the operational stage of the Proposed Development however, the key point of relevance to human health is whether there are impacts on natural areas that are accessible.</p> <p>The construction of the Proposed Development will result in the complete loss of two LWS, the Woolavington Road and Fields LWS and the Puriton Cowslip Field LWS, and the partial land take of several other LWSs as described in Chapter 12. However, the Proposed Development provides ecological benefits with the opportunity to link the retained features more robustly with other habitats of value onsite and offsite, thereby providing a larger, better-connected networks of ecological assets within the Site and wider landscape. This can be achieved through the provision of linear habitat links between features of interest. These features, previously inaccessible, will be available for the Gravity workforce to enjoy.</p> <p>The Proposed Development will develop a previously secure brownfield land and provide new open space and habitat which will provide future users and future residents of the Site means to 'access nature'. Residents surrounding the Site will have access to open spaces on the periphery of the core site and within the proposed residential areas.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents within the area immediately surrounding the Site New residents of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> Groups with pre-existing health conditions (e.g., mobility impairment) New parents 	Moderate beneficial	No further mitigation required.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Local Food Growing	No specific measures are currently proposed to provide facilities for community food growing facilities, however many residential units will have access to gardens which can also be used to grow food. There are allotments/ community growing sites in Puriton and Woolavington, however the current demand and waiting list timing for these allotments is not currently known.	<u>Receptor Groups:</u> <ul style="list-style-type: none"> New residents of the Proposed Development <u>Vulnerable Groups:</u> <ul style="list-style-type: none"> Children (aged 0-17) 	Negligible	Consideration of potential opportunity for a clean growth use is verticulture as a potential opportunity.
Flood Risk	<p>Chapter 13 Water Environment identifies that all flood vulnerable development will be located outside of the modelled flood extents to provide effective inherent mitigation against tidal flooding.</p> <p>A Surface Water Strategy has been development for the Proposed Development. A free discharge from the Site into the Huntspill River will be maintained. On site, surface water runoff will be conveyed utilising a modified rhyme/ditch system. The rhynes/ditches and reed beds will be sufficient to treat surface water runoff prior to discharge from the Site, although it is recommended that this system is augmented with additional on-plot SuDS i.e., upstream of the rhynes.</p> <p>As such the Proposed Development will have a Negligible impact on surface water runoff from the Site, surface water flood risk and flows in adjacent watercourses.</p>	<u>Receptor Groups:</u> <ul style="list-style-type: none"> Existing Residents surrounding the Site; New residents and users of the Site (e.g., including community facility users and employees). <u>Vulnerable Groups:</u> <ul style="list-style-type: none"> No specific groups identified 	Negligible	Measures outlined in Chapter 13 (e.g. implementation of Surface Water Drainage Strategy) to be implemented.

Table 8.10 The assessment of the effects on the Healthy Environment health determinant from the Proposed Development during operation

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
Healthcare Services	<p>The Community Infrastructure Note (Appendix 8.2) identifies that there is some capacity at existing GP Surgeries within the Study Area, however there is an absence of adequate Dental Surgery capacity and there may be a need to address capacity of Dental Surgery.</p> <p>However, it should be noted that Chapter 7 Economics has assumed approximately 750 sqm for a health centre, which will help to reduce pressure on surrounding services by providing on site facilities for new residents/ users of the Proposed Development.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> New residents and users of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	Minor Adverse	If any C class uses are being proposed, contributions to education and health may be required through CIL, to be reviewed and confirmed through the Compliance Form.
Education	<p>The Community Infrastructure Note (Appendix 8.2) identifies that the provision of a new Nursery facility can accommodate the expected demand generated by employees accommodated at the Site. However, there is limited Primary School capacity within Woolavington Village Primary School and Puriton Primary School, and therefore further mitigation will be required in the form of proportionate developer contributions to address the shortfall in Primary School places. There is deemed to be sufficient capacity at Bridgwater College Academy to meet the forecasted demand for secondary school places arising from the Proposed Development.</p> <p>A Skills Charter has been prepared which sets out high level principles and objectives for the Proposed Development. Parcel/occupier specific Employment and Skills Plans will be developed with the Principal Contractor(s)/ Occupier(s). Measures during the operation of the Proposed Development includes recruiting apprentices, provide work experience placements for those unemployed and work experienced placements for</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> New residents and users of the Proposed Development <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> Children (aged 0-17) 	<p>Minor Adverse on local education capacity.</p> <p>Moderate Beneficial for education opportunities.</p>	If any C class uses are being proposed, contributions to education and health may be required through CIL, to be reviewed and confirmed through the Compliance Form.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	those aged 14-18 years in education associated with the operation of the Proposed Development.			
Access to Social Infrastructure	<p>The Proposed Development will provide a range of campus facilities for its workforce, including sport and leisure facilities, restaurants, cafes, shops, and a hotel, which will be provided for new residents within the Proposed Development. The current demand and waiting list timing for these allotments is not currently known.</p> <p>The 37 Club will be replaced as part of the Proposed Development. It will be re-imagined through a feasibility study to ensure a replacement facility is viable. It will be accessible to new residents of the Proposed Development, and existing residents in the surrounding areas.</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing community service users New Community Service users <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> All vulnerable groups identified 	Moderate beneficial	Consideration of infrastructure which fosters social connections throughout the detailed design process
Local Employment and healthy workplaces	<p>The Proposed Development will provide up to 1,000,000 sqm of industrial, commercial and employment floorspace, as well as up to 100,000 sqm of leisure and support facilities and educational facilities.</p> <p>Chapter 7 Economics identifies that the operation of the Proposed Development will support 7,505 gross jobs across the 1,100,000 sqm defined across varying employment uses. The operational employment of the Proposed Development in combination with the operational employment supported by the additional development in the 2032 Baseline equates to 16,155 gross jobs in the labour market.</p> <p>This will provide a stimulation of a new era of cleaner, greener jobs in Sedgemoor, aligned to the sectors of the future. In addition, this will help to</p>	<p><u>Receptor Groups:</u></p> <ul style="list-style-type: none"> Existing residents in the wider area of Somerset <p><u>Vulnerable Groups:</u></p> <ul style="list-style-type: none"> Those with a high level of deprivation, low income or unemployment 	Major Beneficial	Implementation of occupier specific Employment Skills Plans to help deliver economic benefits to the local population to maximise local employment and training.

Health Determinant	Potential Impacts and embedded mitigation	Receptor Group and Vulnerable Group	Likely Significant Effects	Additional Mitigation
	<p>provide replacement for the lost jobs when the ROF closed in 2008.</p> <p>The Gravity Skills Charter (2021) sets out the high-level principles and objectives for future parcel / occupier specific Employment and Skills Plans, which will be developed to deliver benefits to the local community, Gravity and its occupiers. It will help shape the local labour force to meet industry and market requirements and help residents to understand the training opportunities available to them at Gravity. This will include pathways to work from school and/or college to site.</p> <p>The Consultation Report outlines the extensive engagement process that has been undertaken and details the feedback received. Local residents were asked to provide their views on the replacement of lost jobs when the ROF closed. The responses received indicates extremely strong support for the proposals in the belief it will provide opportunities for local people and economy.</p>			

Table 8.11 The Assessment of the effects on the Vibrant Neighbourhoods health determinant from the Proposed Development during operation.

8.8 Further Mitigation

- 8.8.1 Further mitigation measures have been detailed in **Tables 8.4 - 8.10** against the relevant health issue.
- 8.8.2 The following are secured within the Compliance Form:
- Where community facilities are proposed, the management procedures for those facilities (including pitches) should be specified to ensure that facilities are maintained appropriately;
 - Any Compliance Application which includes Dwelling Houses must comply with Building Regulations (M4), wheelchair accessibility and energy efficiency standards; and
 - Any Compliance Application which includes Dwelling Houses must comply with Building Regulations (M4), wheelchair accessibility and energy efficiency standards.

8.9 Residual Effects

Demolition/ Construction

- 8.9.1 With implementation of proposed mitigation measures (both embedded and further), no significant adverse effects are anticipated to human health during the demolition and construction stage. Moderate (significant) beneficial effects are anticipated during this phase in relation to education, and major (significant) beneficial effects are anticipated in relation to local employment.

Operation

- 8.9.2 With the implementation of the proposed mitigation measures (both embedded and additional), no significant adverse effects are anticipated to human health during the operational stage for the majority of effects.
- 8.9.3 There will be significant beneficial residual effects associated with the Proposed Development including in relation to:
- Education (Moderate Beneficial for training opportunities);
 - Access to Social Infrastructure (Moderate Beneficial);
 - Local Employment (Major Beneficial);
 - Walking and Cycling (Major Beneficial);
 - Connectivity (Major Beneficial);
 - Minimising Car Use (Major Beneficial);
 - Playspace, open space and physical recreation (Moderate Beneficial);
 - Access to Nature (Moderate Beneficial).

8.10 Monitoring

- 8.10.1 No further monitoring measures are required in relation to human health. Monitoring requirements are outlined in the transport chapter to monitor and manage transport effects through implementation of a site wide Travel Plan and Monitor and Manage Plan.

8.11 Summary

- 8.11.1 An assessment has been undertaken with regard to the likely significant effects of the Proposed Development on the health and wellbeing and social impacts on residential communities and other health-sensitive groups (referred to as ‘receptors’). The assessment considers national and local policy and is based on the Healthy Urban Development Unit (HUDU) planning checklist which sets out key themes, including; Housing, Transport, the Environment and Neighbourhood dynamics, which can have a positive or negative effect on the health and wellbeing of the population. These are referred to as the ‘wider determinants of health’.
- 8.11.2 The assessment used a variety of sources to provide details of current health and wellbeing issues including local health profiles, Somerset Joint Strategic Needs Assessment and Somerset Improving Lives strategy. The review of data indicated that Sedgemoor generally performs better than the national average in terms of overall levels of deprivation, however there is inequality within this. Health indicators where Sedgemoor performed significantly worse than the England average include suicide rate, emergency hospital admissions for Intentional self-harm, hip fractures in people aged 65 and over, estimated dementia diagnosis, admission episodes for alcohol specific conditions, smoking, and percentage of adults classified as overweight or obese. The Site lies within the Puriton and Woolavington ward of Knoll. There are higher levels of income deprivation, child poverty and older people in deprivation within the ward of Puriton and Woolavington than the ward of Knoll.

Demolition and Construction

- 8.11.3 Demolition and Construction related health risks relate to the potential for reduced environmental amenity; such as through noise disturbances, increased traffic delays and higher levels of dust and poor air quality. These local environmental issues have the potential to disrupt or impact health and wellbeing of the population, resulting in increased stress-related illnesses and cardiovascular diseases. However due to the temporary nature of construction activities, these changes to the local environment are not considered to be significant with regard to human health. A Framework Demolition and Construction Environmental Management Plan (FDCEMP), will set out measures to manage construction works, including measures to reduce transport related impacts. Furthermore, it is anticipated that there will be a moderate beneficial effect in relation to the creation of training and education opportunities during this phase, and a major beneficial effect in relation to new construction jobs. No residual significant adverse demolition and construction effects are anticipated.

Operation

- 8.11.4 Beneficial effects are anticipated as a result of the Proposed Development through promotion of active travel. The Proposed Development will provide a range of measures to facilitate and encourage walking and cycling, including new footway and cycleways throughout the Site, and enhanced connectivity to the surrounding area, resulting in major beneficial (significant) effects on walking and cycling, connectivity and minimising car use.
- 8.11.5 The Proposed Development may have an overall impact on several environmental aspects; however, no significant residual adverse effects are anticipated including in relation to air quality, noise, contaminated land, and flood risk. Relevant mitigation measures in relation to the above topics have been identified to see that potential adverse effects are reduced to an acceptable level. Moderate beneficial (significant) effects are anticipated in relation to access to nature and provision of play space, open space and physical recreation given the provision of large areas of informal and formal open space throughout the Proposed Development and play facilities for children.

- 8.11.6 A range of new social infrastructure will be provided for the future workforce of the Proposed Development to use, including leisure and sport facilities, restaurants, cafes, and shops. The Proposed Development will provide moderate beneficial (significant) effects regarding provision of social infrastructure, as well as access to education and training opportunities. The Proposed Development will provide major beneficial (significant) effects with regards to the creation of new employment opportunities.

8.12 Referencing

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Sports England, 2020, "Active Lives data tables" Available at: <https://www.sportengland.org/know-your-audience/data/active-lives/active-lives-data-tables>

9 Access and Transport

9.1 Introduction

- 9.1.1 This Chapter has been prepared by Stantec UK Ltd in accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.
- 9.1.2 This chapter describes the assessment methodology, the baseline conditions, the measures package developed to prevent, reduce, or offset likely significant effects, and the resulting likely effects of the Proposed Development relating to access and transport.
- 9.1.3 The methodology used in this chapter has been developed to fulfil the requirements of the EIA Regulations informed by guidance set out within the following:
- “Guidelines for the Environmental Assessment of Road Traffic” (Guidance Note Number 1) published by the Institute of Environmental Assessment (now the Institute of Environmental Management and Assessment (IEMA)) in 1993;
 - Volume 11 of the Design Manual for Roads and Bridges (DMRB) – Environmental Assessment (Highways England – now known as National Highways (NH)); and
 - Planning Practice Guidance (PPG) documents ‘Environmental Impact Assessment’ and ‘Travel Plans, Transport Assessments and Statements in Decision-Taking’ first published by the Ministry for Housing, Communities and Local Government (MHCLG) in 2014 as a live online resource.
- 9.1.4 This chapter has been prepared in the context of a detailed assessment undertaken and reported on within the Transport Assessment (TA) which is submitted in support of the LDO. While the TA has been used as source material, it predominately identifies the compliance of the Proposed Development with national and local transport policy and establishes that a safe and acceptable access will be provided. The TA quantifies the transport and highways impact of the Proposed Development, but the environmental impact of the road traffic it will generate requires an assessment against different criteria; therefore, the assessment has been undertaken against the criteria set out in the “Guidelines for the Environmental Assessment of Road Traffic” referred to above.
- 9.1.5 The reader is where appropriate referred to the TA and supporting Framework Travel Plan (FTP), standalone documents where further information is available. The FTP sets out the proposed approach to ongoing site transport management measures including monitoring of site multi-modal trip generation, site travel planning and car park management measures.
- 9.1.6 This chapter should also be read in conjunction with **Chapter 3**: Description of the Proposed Development and with respect to relevant parts of other chapters including **Chapter 10**: Noise & Vibration and **Chapter 11**: Air Quality, where common receptors have been considered and where there is an overlap or relationship between the assessment of effects.
- 9.1.7 The appendices submitted with this chapter are:
- Transport Assessment (TA) – **Appendix 9.1**
 - Framework Travel Plan (FTP) – **Appendix 9.2**
 - Supporting Drawings / Figures – **Appendix 9.3**

- Draft Monitor and Manage Plan – **Appendix 9.4**

9.2 Policy, Legislation, Guidance and Standards

- 9.2.1 The Development has been considered from a transport perspective in the context of the below key legislation, national and local policy and guidance documents.

Legislative Context

- 9.2.2 The following legislation is relevant to the assessment of the effects on transport receptors:
- 9.2.3 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended). Part 4 of Schedule 4 states that “*A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health...*” should be included within the environmental statement. Traffic and Transport has the potential to affect population and human health both directly e.g. through traffic collisions and indirectly through encouraging active travel.
- 9.2.4 In addition, EU guidance is still relevant despite exit from the EU and hence this chapter also takes account of the European Commission's Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) EIA for Projects Guidance 2017 ("EU Guidance").

Planning Policy Context

- 9.2.5 There are several policy and guidance documents at the national and local level that are relevant to the Proposed Development. In addition to policy referenced in **Chapter 6: Planning Policy Context**, policy directly applicable to this technical specialism are listed below:

National Planning Policy Framework, 2021

- 9.2.1 The revised National Planning Policy Framework (NPPF) was published in July 2021 and replaced the 2019 edition of the NPPF. The presumption in favour of sustainable development remains the core objective of the NPPF (paragraph 10 states that “*so that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development*”).
- 9.2.2 To promote sustainable transport, paragraph 110 states that “*in assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:*
- *appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;*
 - *safe and sustainable access to the Site can be achieved for all users; and*
 - *any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.*”
- 9.2.3 Additionally, paragraph 113 of the NPPF states “*all development that generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed.*”
- 9.2.4 In Section 9 ‘Promoting sustainable transport’, paragraph 104 states that “*transport issues should be considered from the earliest stages of plan-making and development proposals, so that:*

- *the potential impacts of development on transport networks can be addressed;*
- *opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;*
- *opportunities to promote walking, cycling and public transport use are identified and pursued;*
- *the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and*
- *patterns of movement, streets, parking and other transport considerations are integral to the design of schemes and contribute to making high quality places”.*

9.2.5 Paragraph 111 of the NPPF states “development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.”

National Planning Practice Guidance, 2014: Travel Plans, Transport Assessments and Statements

9.2.6 The National Planning Practice Guidance¹ (NPPG) provides the overarching framework within which the transport implications of development should be considered. It provides advice on the preparation of Transport Assessment, Transport Statements and Travel Plans. The key advice is as follows:

‘Travel Plans, Transport Assessments and Statements are all ways of assessing and mitigating the negative transport impacts of development in order to promote sustainable development. They are required for all developments which generate significant amounts of movements.’ (Paragraph 2).

9.2.7 The key principles within which Transport Assessments should be undertaken are detailed as follows:

“Travel Plans, Transport Assessments and Statements should be:

- *proportionate to the size and scope of the Proposed Development to which they relate and build on existing information wherever possible;*
- *established at the earliest practicable possible stage of a development proposal;*
- *be tailored to particular local circumstances (other locally-determined factors and information beyond those which are set out in this guidance may need to be considered in these studies provided there is robust evidence for doing so locally);*
- *be brought forward through collaborative ongoing working between the local planning authority/ transport authority, transport operators, rail network operators, Highways Agency where there may be implications for the strategic road network and other relevant bodies. Engaging communities and local businesses in Travel Plans, Transport Assessments and Statements can be beneficial in positively supporting higher levels of walking and cycling (which in turn can encourage greater social inclusion, community cohesion and healthier communities)’.*

¹ <https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements>

- 9.2.8 The guidance emphasises the importance to consult the relevant local authorities at the outset in order to scope the transport assessment work, on the basis of the principles highlighted above.

National Design Guide, 2021

- 9.2.9 The National Design Guide document (NDG), which was published in October 2019 and revised in January 2021, sets out the characteristics of well-designed places and good design practice, forming part of the Government's suite of planning practice guidance.
- 9.2.10 The guidance is structured around ten characteristics, which work in tandem to “create [a] *physical Character*”, “*nurture and sustain a sense of Community*”, and “*work to positively address environmental issues affecting Climate*”.
- 9.2.11 The most pertinent characteristics to be borne in mind are:
- Context – whether the Site relates well to its local and wider context;
 - Built Form – whether development is walkable / cyclable and whether public transport is accessible;
 - Movement – whether there is a movement network that makes connections to destinations, places, and communities, for all modes of transport; and
 - Lifespan – includes principles of considering how waste and parking will be managed from the outset.
- 9.2.12 This characteristic of the NDG seeks to ensure that developments are “*accessible and easy to move around*”, and notes that:
- “Patterns of movement for people are integral to well-designed places. They include walking and cycling, access to facilities, employment and servicing, parking and the convenience of public transport. They contribute to making high-quality places for people to enjoy... Their success is measured by how they contribute to the quality and character of the place, not only how well they function”.*
- 9.2.13 A well-designed movement network is defined within the NDG as a clear pattern of streets that:
- *“is safe and accessible for all;*
 - *functions efficiently to get everyone around, takes account of the diverse needs of all its potential users and provides a genuine choice of sustainable transport modes;*
 - *Limits the impacts of car use by prioritising and encouraging walking, cycling and public transport, mitigating impacts and identifying opportunities to improve air quality;*
 - *Promotes activity and social interaction, contributing to health, well-being, accessibility and inclusion; and*
 - *Incorporates green infrastructure, including street trees to soften the impact of car parking, help improve air quality and contribute to biodiversity.”*
- 9.2.14 These principles are further established in Section M1 ‘A connected network of routes for all modes of transport’, M2 ‘Active Travel’, and M3 ‘Well-considered parking, servicing, and utilities infrastructure for all users’.

Decarbonising Transport, A Better Greener Britain, 2021

- 9.2.15 The Department for Transport (DfT) published 'Decarbonising Transport, A Better Greener Britain' in 2021.
- 9.2.16 This plan follows on from 'Decarbonising transport: setting the challenge', published in March 2020, which laid out the scale of additional reductions needed to deliver transport's contribution to legally binding carbon budgets and delivering net zero by 2050.
- 9.2.17 This plan sets out the government's commitments and the actions needed to decarbonise the entire transport system in the UK. It includes:
- a pathway to net zero transport in the UK.
 - the wider benefits net zero transport can deliver.
 - the principles that underpin our approach to delivering net zero transport.
- 9.2.18 However, given the rate of technological advancement and uncertainty in the precise mix of future zero emission solutions, and the probability of significant changes in travel behaviour over the years ahead, this plan does not precisely plot each individual step to fully decarbonising transport modes over the next 30 years. It does however set out a series of actions and timings that will decarbonise transport by 2050 and deliver against carbon budgets along the way, whilst also responding to the challenge of the COVID-19 pandemic in the process.
- 9.2.19 The strategic priorities identified for achieving net zero are confirmed as:
1. Accelerating modal shift to public and active transport
 2. Decarbonising road transport
 3. Decarbonising how we get our goods
 4. UK as a hub for green transport technology and innovation
 5. Place based solutions to emissions reduction
 6. Reducing carbon in a global economy

Bus Back Better, National Bus Strategy for England, 2021

- 9.2.20 In September 2019, the government set out how it would launch a revolution in bus services, in other words, delivering a better deal for bus users and committing to publishing a National Bus Strategy.
- 9.2.21 In February 2020, the Prime Minister announced that bus services across the country would be transformed with simpler fares, thousands of new buses, improved routes and higher frequencies.
- 9.2.22 The DfT published Bus Back Better, National Bus Strategy for England in 2021.
- 9.2.23 This national strategy sets out the vision and opportunity to deliver better bus services for passengers across England, through ambitious and far-reaching reform of how services are planned and delivered.
- 9.2.24 The vision is defined as *'to get bus use back to what it was before the pandemic. Then we want to increase patronage and raise buses' mode share. We can only do these things by ensuring that buses are an attractive alternative to the car for far more people'*.
- 9.2.25 The vision is to be achieved by making buses:
1. More frequent
 2. Faster and more reliable
 3. Cheaper

4. More comprehensive
 5. Easier to understand
 6. Easier to use
 7. Better to ride in
 8. Better integrated with other modes and each other
 9. Greener
 10. Accessible and inclusive by design
 11. Innovative
 12. Seen as a safe mode of transport
- 9.2.26 It is expected that all Local Transport Authorities (LTA) will publish a local Bus Service Improvement Plan (BSIP). These new plans must set out how they will use their Enhanced Partnership or franchising scheme to deliver an ambitious vision for travel by bus, meeting the goals and expectations in this strategy and driven by what passengers and would-be passengers want in their area.
- 9.2.27 Bus Back Better in Somerset County Council (SCC) are in the process of drafting a BSIP in collaboration with the County's bus and community transport operators, which is intended to incorporate feedback obtained from a public engagement process which has been undertaken. The research findings indicated the following top priorities:
1. Additional and clearer bus service information
 2. Additional bus routes and higher frequencies including enhanced weekend timetables
 3. Wider network connectivity / strategic enhancement
 4. Better integration with rail and other modes of transport
 5. Cheaper and simplified fares
- 9.2.28 The BSIP will be submitted by SCC to the DfT in October 2021 with a view to achieving agreement and completion by April 2022.
- Sedgemoor Local Plan 2011 – 2032**
- 9.2.29 The Sedgemoor Local Plan 2011-2032 sets out how the district will grow and develop into the future. It includes the vision, priorities and policy framework for future development in the district, including addressing the requirements relating to housing, employment, retail and other facilities and infrastructure.
- 9.2.30 The Local Plan priority stated in paragraph 3.3 is *"To ensure development in Sedgemoor supports the principles of sustainable development and delivers sustainable communities whilst respecting the diversity in function and character of Sedgemoor's towns, villages and countryside."*
- 9.2.31 Strategic priorities include:
- a. To deliver development that is of high quality, sustainable, distinctive, inclusive, safe and respectful of its context.
 - b. To promote safe and sustainable transport options and manage congestion.
- 9.2.32 Policy S3 Infrastructure Delivery states that, *"New development will be required to provide and contribute towards the provision of services, facilities and infrastructure at a rate, scale and pace to meet the needs and requirements that are expected to arise from that development. All new development that generates a demand for infrastructure will only be permitted if the reasonable and necessary on and off-site infrastructure required to support and mitigate the impact of the development is provided."*
- 9.2.33 Policy B16 Transport states that, *"Proposals that provide opportunities for cycling, walking and enhanced public transport both within the town and between key destinations including*

Taunton and Burnham (A38 corridor), Street and Minehead (A39 corridor) and the town's surrounding rural areas will be supported".

9.2.34 Policy D13 Sustainable Transport and Movement states that *"Travel management schemes and development proposals that reduce congestion, encourage an improved and integrated transport network and allow for a wide choice of modes of transport as a means of access to jobs, homes, leisure and recreation, services and facilities will be encouraged and supported. Proposals will:*

- a. Support the travel improvements identified in the Somerset Future Transport Plan (transport policies, implementation plan and modal strategies), Infrastructure and Delivery Study and Sedgemoor Transport Strategy (when published);*
- b. Be compatible with the existing transport infrastructure or, if not, provision shall be made where necessary for improvements to infrastructure to enable development to proceed;*
- c. Contribute to reducing adverse environmental issues, including air, light and noise pollution, vibration and surface water run-off, through appropriate mitigation measures, including tree planting along road corridors for shade, amenity and air quality;*
- d. Enhance road and personal safety;*
- e. Enhance the facilities for pedestrians, cyclists, those with reduced mobility and other users;*
- f. Develop innovative and adaptable approaches that deliver higher quality and accessible public transport options;*
- g. Encourage efficient, safe and sustainable freight transport; and*
- h. Be resilient to climate change."*

9.2.35 Policy D14 Managing the Transport Impact of Development of the Local Plan states that, *"Development proposals that will have a significant transport impact should:*

- a. Be supported by an appropriate Transport Assessment, Air Quality Assessment, Noise and Vibration Assessment and Ecological Surveys where there are significant implications;*
- b. Engage at an early stage with relevant bodies such as the Sedgemoor District Council (SDC), Somerset County Council (SCC), National Highways (NH, formerly known as Highways England) and Network Rail (NR) regarding the proposal and scope of supporting information required;*
- c. Include an appropriate Travel Plan outlining how the development will manage transport impacts and encourage more sustainable modes of travel;*
- d. Ensure provision is made for inclusive, safe and convenient access for pedestrians, people with disabilities, cyclists and users of public transport that addresses the needs of all;*
- e. Provide safe access to roads of adequate standard within the route hierarchy;*
- f. Ensure that the expected nature and volume of traffic and parked vehicles generated by the development would not compromise the safety and/or function of the local or strategic road networks in terms of both volume and type of traffic generated;*

- g. Comprehensively address the transport impact of development and appropriately contribute to the delivery of the necessary transport infrastructure;*
- h. Not prejudice existing and new safeguarded transport infrastructure (sites and routes) as shown on the Local Plan Policies Map;*
- i. Enhance and develop rights-of-way as a means of managing transport impacts of development and should not reduce the convenience and safety of existing rights-of-ways, bridle paths and cycle paths, unless suitable alternative routes are provided;*
- j. Ensure car parking and vehicle servicing at levels appropriate to the development and in accordance with the parking standards detailed within the Somerset County Council Parking Strategy; and*
- k. Adequately assess and provide any required improvements to level crossings where development may result in a material increase in pedestrian and/or vehicular use of a level crossing, in consultation with Network Rail”.*

Transport Investment Strategy 2050

- 9.2.36 The Transport Investment Strategy 2050 (TIS) identifies the key transport schemes required to support economic growth and new housing in Sedgemoor, whilst aligning transport infrastructure with development to achieve long-term, sustainable growth to 2050. The Strategy considers all modes of travel across all areas of Sedgemoor, as well as connections to and from the district. It also considers the opportunities of new and so-called disruptive technologies in transport such as on-demand and shared mobility. The TIS builds on the Sedgemoor Local Plan 2011-2032, identifying additional infrastructure requirements to support development beyond 2032 or even to accelerate development.
- 9.2.37 The vision of the TIS is to support the delivery of a low carbon, clean growth transport network for the future that creates opportunities for all by improving the day-to-day accessibility and connectivity for Sedgemoor’s residents, businesses, and visitors.
- 9.2.38 In specific reference to Gravity, paragraph 2.20 states *“The Enterprise Zone at the former Royal Ordnance Factory is one of a very few locations within Sedgemoor with capacity to accommodate large scale requirements emerging from the Hinkley Point C supply chain and growth related to other industrial sectors. Traffic accessing the Site is expected to increase volumes on the A39, A38 and B3141. The planned innovation campus will be one of the South West’s largest commercial locations when fully built out as Gravity is expected to generate around 4,000 skilled jobs on site. The additional output generated by the Gravity Site will effectively double Sedgemoor’s current economic growth rate over a 25-year period. Gravity has the potential to change the above figures from the Trip End Model and provide a centre for knowledge-intensive jobs for Sedgemoor residents as well as attracting workers from outside the district.”*
- 9.2.39 Within the TIS several interventions and initiatives are set out to improve journeys across Sedgemoor. The interventions relating to Gravity are briefly set out below:
- a. R3 Gravity Rail Link – Providing a direct rail link for passengers and freight towards Highbridge & Burnham station from Gravity.*
 - b. Policy HW3 and Dunball – Increased capacity across the junctions and further signalisation to prevent increases in traffic resulting from forecast growth from interfering with the operation of the Dunball roundabout and the M5 slip roads.*
 - c. HW1 Smart Motorway – The District will be seeking full implementation of Smart Motorway infrastructure along the M5 corridor, which increases capacity and has the potential to reduce congestion and delays and improve reliability and resilience.*

- d. *PT1 High frequency bus services to Gravity – seen as key to the successful and sustainable integration of the enterprise zone into the local labour market will be a high-quality, high frequency bus service linking Gravity to surrounding settlements.*
- e. *WC1, WC2, WC3 Walking and cycling links from Burnham-on-Sea and Bridgwater to Gravity - As the Site approaches first occupation, there is a need for a high quality walking and cycling connection between Gravity and Highbridge and Burnham-on-Sea (WC1).*
- f. *SM1 Smart mobility at Gravity - Gravity has the potential to build on local business and infrastructure assets to be a test-bed of innovative developments in the field of mobility, including Connected and Autonomous Vehicles.*
- g. *EV1 Electric vehicles – Sedgemoor will support the transition to cleaner fuels in two ways. Firstly, through the provision of publicly available, easy-to-use and widely distributed electric vehicle (EV) charging infrastructure. Secondly, through the planning system, developers will be encouraged to provide fast charging infrastructure for all forms of electric transport in domestic, commercial and public areas throughout Sedgemoor.*

Climate Emergency Strategy and Action Plan 2020-2030

- 9.2.1 SDC's Climate Emergency Strategy (CES) aims to describe the six key areas of action which will lead Sedgemoor towards becoming carbon neutral by 2030, outline the overarching goals and explaining the scope and background to the Strategy.
- 9.2.2 Specific Travel action within the CES Action Plan include the following:
 - a. Promoting active travel (walking & cycling) options by improving infrastructure and shifting towards a more cycle-friendly culture in Sedgemoor;
 - b. Engaging with local employers and communities to encourage them to adopt travel plans that promote walking, cycling, car sharing and public transport with their staff, and participating in this ourselves;
 - c. Increasing number of Electric Vehicle (EV) charging points throughout Sedgemoor;
 - d. Progressing our own fleet of council vehicles into Electric Vehicles;
 - e. Supporting agile working and encouraging council staff to work from home when possible, reducing the need for travel; and
 - f. Support the improvement of public transport infrastructure, both increasing connectivity and supporting carbon alternative public transport options

Bridgwater Vision

- 9.2.3 This first iteration of the Bridgwater Vision (2009) describes the Gravity Site as one of the key character areas to deliver the overall vision. It explains that the Gravity Site will be a significant employment area linked to a renewable, low carbon energy source. It continues to describe that the employment area could benefit from on-site rail links, a bespoke travel plan service for workers from Bridgwater town centre and the promotion of cycle tracks and footpaths through the Site providing links to Puriton, Woolavington and Bridgwater, encouraging greater use of non-vehicular transport modes.
- 9.2.4 In 2015, the Bridgwater Vision was refreshed to provide an update on the successes delivered over the intervening 6-year period. Gravity continues to be identified as a priority, and the concept of the Huntspill Energy Park (HEP) development was described, and the Vision anticipated it could be a significant employment development for B1 (business) and B2

(general industrial) energy related uses for the town linked to a renewable low carbon energy source.

Puriton Energy Park SPD

- 9.2.5 SDC adopted the Puriton Energy Park SPD in March 2012. The intent of the SPD was to provide further information to attract market interest and facilitate site disposal. The SPD provides a framework for assessing planning applications for the Site and focused on the main development objectives required to deliver the Energy Park. Importantly, the SPD clearly states that it does not set out what the Site will ultimately look like or who will occupy it, which it states is the role of subsequent planning applications.
- 9.2.6 Since 2012, much has changed in terms of the national policy and political context, with a new Framework, a stronger focus on EZ delivery, Industrial Strategy and Clean Growth. The SPD is therefore somewhat outdated in places, however, does provide some valuable input in terms of design principles.
- 9.2.7 Subsequently, design principles have also been approved under condition discharge relating to the Extant Consent, which take account of the SPD ambitions. These take account of the clean and inclusive growth ambitions for Gravity and the priority afforded to smart mobility as an integral element of the smart campus.

9.3 Consultation

- 9.3.1 The TA, prepared alongside this chapter, has been prepared in accordance with a scope of work that has been discussed extensively and agreed in consultation with SDC, SCC and NH.
- 9.3.2 The TA scoping process commenced in November 2020 and has continued through to the submission of the LDO. The scoping process has involved the preparation of a series of technical notes and reports, and the holding of regular LDO Transport Sub Group meetings (as a subsidiary group of the Gravity Delivery Group).
- 9.3.3 The LDO Transport Sub Group comprised appropriate members representing a range of different stakeholders, including:
- SCC
 - NH
 - SDC
 - Heart of the South West Local Enterprise Partnership
 - Network Rail (NR)
 - Arup representing SDC
 - WSP representing SCC
 - Womble Bond Dickinson LLP
 - This Is Gravity Ltd
 - Stantec UK Ltd
- 9.3.4 As part of the stakeholder consultation informing the preparation of this Chapter, ES Scoping Report responses have been received from a number of these stakeholders including SDC, SCC (including specifically in respect of Public Rights of Way), NH and NR, and information

set out within this Chapter and supporting documentation responds to the various issues raised.

- 9.3.5 This chapter compares the likely significant effects of the Proposed Development against a 2032 Baseline scenario which is defined later in this chapter. However, the following consideration has been scoped out of the assessment as per the ES Scoping Report submitted to SDC on 6th July 2021, for the reasons outlined.

Assessment of unusual or especially hazardous materials

- The Proposed Development could include a range of potential land uses / buildings; however they are all anticipated to be built using traditional construction techniques or off-site manufacturing that would not necessitate the transit of any unusual or especially hazardous materials. Therefore, it is considered that assessment in this regard for the construction phase is not needed within the ES to confirm that there would not be a significant impact from the Proposed Development.

9.4 Methodology

- 9.4.1 This section provides an overview of the study area and the methodology for baseline data collection, as well as the assessment methodology used in this chapter to determine the significance of environmental effects of the Proposed Development on sensitive receptors in the study area. The adopted methodology has been determined through reference to guidance and best practice, including the IEMA 'Guidelines for the Environmental Assessment of Road Traffic' (Guidance Note No. 1) document and Volume 11 of the DMRB and informed by the pre-application Transport Sub Group meetings, as referred above.

Study Area

- 9.4.2 The IEMA "Guidelines for the Environmental Assessment of Road Traffic" suggest that the study area for the EIA from a traffic and transport perspective should consider highway links which fall within two rules, as stated below.
- Rule 1: Include in the EIA highway links where 18-hour Annual Average Weekday Traffic (AAWT) flows will increase by more than 30% (or the number of Heavy Goods Vehicles (HGV) will increase by more than 30%).
 - Rule 2: Include in the EIA any other specifically sensitive area where 18-hour AAWT flows will increase by 10% or more.
- 9.4.3 This guidance is based upon knowledge and experience of traffic and transport related environmental effects. The 30% threshold of Rule 1 is based upon research and experience, with less than a 30% increase in traffic flow generally resulting in imperceptible changes in the environmental effects of traffic and transport. At a simple level, the guidance considers that projected changes in total traffic flow of less than 10% creates no discernible environmental effects, hence the threshold of Rule 2.
- 9.4.4 For the purposes of the assessment undertaken in this chapter, a 'specifically sensitive area' is a highway link with receptors that have a 'high' sensitivity to be considered against the threshold defined in Rule 2. Other highway links with receptors of negligible, low, or medium sensitivity will be considered against the threshold defined in Rule 1.
- 9.4.5 The study area adopted for the assessment, comprising of numerous highway links, focusses on locations that are logically most likely to be impacted by the development proposals. The study area therefore comprises of Woolavington Road, Woolavington Hill, B3141 Causeway, the Gravity Link Road, A39 Puriton Hill, M5 Motorway, and the A38 Bristol Road.

9.4.6 The complete list of links considered are as specified in **Table 9-1** and are shown also in **Figure 1** included in **Appendix 9.3**:

Link Reference	Description
Link 1	Link Road – Between Gravity Site and Entrance Roundabout
Link 2	Link Road – Between Entrance Roundabout and Hillside
Link 3	Link Road – Between Hillside and A39
Link 4	Woolavington Road – Between Entrance Roundabout and Proposed Residential (Secondary) Access
Link 5	Woolavington Road – Between Proposed Residential (Secondary) Access and Woolavington Primary School
Link 6	Woolavington Road – Between Woolavington Primary School and B3141 / Woolavington Hill Crossroads
Link 7	B3141 Causeway
Link 8	B3141 Woolavington Hill
Link 9	Woolavington Road – West of Entrance Roundabout (Puriton)
Link 10	A39 – East of Puriton Hill Roundabout
Link 11	A39 – Between Puriton Hill Roundabout and M5 Junction 23
Link 12	M5 Motorway – Mainline North of Junction 23
Link 13	M5 Motorway – Mainline South of Junction 23
Link 14	A38 – Between Junction 23 and Dunball Roundabout
Link 15	A38 – North of Dunball Roundabout
Link 16	A38 – South of Dunball Roundabout

Table 9-1 EIA Assessment Traffic Flow Links

Assessment of Significance

9.4.7 Should the Proposed Development result in increases in traffic flow above those identified in Rules 1 and 2, an assessment of the significance of transport effects will be determined based on the magnitude of impact, receptor sensitivity and professional judgement. This is shown in **Table 9-2** below.

	Sensitivity of Receptor
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Magnitude of Impact	High	Medium	Low
Large	Substantial	Major	Moderate
Moderate	Major	Moderate	Minor
Small	Moderate	Minor	Minor
Negligible	Negligible	Negligible	Negligible

Table 9-2 Significance Matrix

9.4.8 During the operational phase, potential impacts are expected to arise for various criteria which are set out below in **Table 9-3** and will be assessed if proven to be necessary

Impact	Operational Phase
Severance	✓
Driver Delay	✓
Pedestrian Delay	✓
Pedestrian Amenity	✓
Fear and Intimidation	✓
Accidents and Safety	✓

Table 9-3 Potential effects from operational phase to be assessed

Baseline Data Collection

9.4.9 Numerous data sources have been used by Stantec to collect transport data that has been used at various stages of both the TA work and the assessment undertaken in this chapter of the ES. A summary of these data sources and what has been provided is set out below.

- Personal Injury Accident (PIA) data for the most recent five-year period obtained from SCC
- Desk based review of pedestrian, cycle and public right of way networks, along with receptors, in the vicinity of the Site
- Desk based review of public transport options in the vicinity of the Site
- 2018 junction turning counts for M5 Junction 23, A38 Dunball Roundabout and A39 Puriton Hill / Hall Road junction provided by NH
- 2011 junction turning counts (A39 / Puriton Hill only) used within the approved assessments for the 2017 Planning Consent
- Extensive Automatic Traffic Counter data (2018)

- Traffic data supporting the Puriton and Woolavington approved Village Enhancement Scheme (VES) and 2017 Planning Consent documentation
- NH's Webtris traffic database
- Trip End Model Presentation Program (TEMPro) for deriving traffic growth factors for 2011-18 and 2018-32 periods for 'motorway', 'principle' and 'minor' road types
- Committed development Transport Assessments for trip generation, distribution and base count data
- SDC Adopted Local Plan 2011-2032 housing and jobs growth trajectories

Receptors

9.4.10 The categories of receptor sensitivity have been defined from the principles set out in the IEMA Guidelines and have been used to outline in broad terms, the sensitivity of receptors to traffic for the categories of effect assessed in this chapter. The receptor sensitivity definitions that have been used are set out in **Table 9-4**.

High Sensitivity	Medium Sensitivity	Low Sensitivity
<ul style="list-style-type: none"> ■ schools, colleges and other educational institutions (nurseries have been assumed to be included in this category) ■ retirement / care homes for the elderly or infirm ■ roads used by pedestrians with no footways ■ road safety black-spots 	<ul style="list-style-type: none"> ■ hospitals, surgeries and clinics ■ parks and recreation areas ■ shopping areas ■ roads used by pedestrians with narrow footways 	<ul style="list-style-type: none"> ■ open space ■ tourist / visitor attractions ■ historical buildings ■ churches ■ other roads with active frontages and dwellings

Table 9-4 Receptor Sensitivity

9.4.11 The main receptors of note identified within the study area above includes:

- Woolavington Village Primary School, Woolavington Road ('high' sensitivity)
- Woolavington Branch Surgery, Woolavington Road ('medium' sensitivity)

9.4.12 These medium and high sensitivity receptors are located on Link 5.

Assessment Scenarios

9.4.13 The two following baseline scenarios are presented in this chapter:

- *Current State of the Environment* – A description of the current state of the environment, which in this case is at the stage of part implementation of the Extant Consent (i.e., the Gravity Link Road, ecological enhancements and Site remediation completed).
- *2032 Baseline* - An outline of what is likely to happen to the environment incorporating the 2017 Planning Consent, including the Gravity Link Road and the VES, but excluding the safeguarded energy land uses, and the current approach to transport forecasting and changes in travel trends. The 2032 Baseline also incorporates projected growth in background traffic levels on the strategic and local road networks due to demographic and planned development growth forecasts, specific vehicle trip generation for committed

development sites which have been granted planning permission but not implemented or included in TEMPro (identified later), Hinkley Point C operational phase traffic, and committed highway schemes². Transport trends such as the publication of the national bus strategy and other decarbonisation of transport policies are also considered.

- 9.4.14 The 2032 future year has been identified as it is the end of the current Local Plan period and a date by which it is reasonable to assume that the development approved by the LDO will have been delivered.

Gravity Transport Assessment Methodology

- 9.4.15 The Proposed Development has been assessed against the 2032 baseline scenario.
- 9.4.16 The TA provides further detail in respect of the trip generation assessment methodology with a summary of the assessment approach outlined here.
- 9.4.17 A bespoke scenario testing spreadsheet based multi-modal travel generation, distribution and assignment tool – summarised as a scenario testing and assignment tool – has been developed to enable multiple scenarios for Gravity to be evaluated at a high level in order to help define the most effective mitigate at source measures. A single 'core scenario' (Proposed Development) test reflecting the desirable outcome scenario (as is the objective with a Scenario Testing approach) has been used within this assessment to produce assigned traffic flows across the network for impact assessments. The key characteristics of this tool are as below (and set out in more detail in the TA):
- Main input variables are land use mix and scale, and employee density by land use (reflecting the description of development and associated Parameter Plans).
 - Peak hour and daily person trip generations are produced for each land use.
 - SDC Transport Model zoning system is used for trip distribution refined to reflect Gravity internal land uses.
 - A gravity function based model is used to assign the trips to and from all model zones and the Site. The gravity function is based on Census data and sensitivity tested with National Travel Survey data.
 - Journey time skims by mode are generated and applied to a logit model to output zone to zone mode share values. For walking and cycling, only zones within practicable walking and cycling distance were used. For public transport, only zones (or part zones) within a reasonable walk of public transport services were included.
 - Output matrices by mode are used to assign vehicle trips to the highway network.
 - A wide range of adjustable variables have been considered to enable the impact of multiple future scenarios to be tested and also to test the sensitivity of outputs to changes in individual variables. The main variables included:
 - Different propensities to cycle from current levels of cycling, using the Propensity to Cycle for England and Wales .

² A38 Dunball roundabout was identified for improvement as part of the 2017 Planning Consent . An improvement scheme is identified in the 2017 Planning Consent Section 106 but it has not been delivered to date. However, SDC has identified the capacity of this junction as a constraint to development growth in Bridgwater and has committed to forward fund the delivery of the improvement scheme to unlock development. The approved scheme for Dunball is undergoing final technical review.

- Different levels (frequency) of public transport from existing services to dedicated minibus services for employees providing two-way travel between the Site and home.
 - Different levels of car sharing.
 - Different levels of home working.
 - Different levels of internalisation of trips between residential and employment and other internal land uses.
 - A range of costs applied to the gravity model to encourage modal shift to the public transport services proposed. These costs could be realised by Gravity in the form of subsidised public transport to encourage take up, or could be a direct cost to the employees, for example, in the form of daily parking charges or a combination of approaches.
 - Different working patterns including shift working.
- 9.4.18 The scenario testing and assignment tool was developed in consultation with the NH, SDC and SCC and comments were sought and addressed on development versions of the tool and incorporated during its development. The tool was agreed to be a robust tool for assessing the development.
- 9.4.19 The tool was calibrated against the extant 2017 Planning Consent land uses (excluding the safeguarded land) to support the results in terms of overall weekday peak hour trip generation and modal share such that they were comparable and realistic.
- 9.4.20 The trips generated by the Proposed Development were assigned to the highway network based on the quickest available route. This applies to walk, cycle, public transport and employee car trips.
- 9.4.21 Traffic was assigned to the wider network across the model area using a GIS assignment approach. This was undertaken based on an 'all or nothing' assignment of the quickest route from each individual zone to the Site for the employment uses and vice versa for the residential uses. Navtec Navman journey time route data, (from the SDC Sedgemoor Transport Model), were used to provide realistic journey times within the 'all or nothing' assignment.
- 9.4.22 Three scenarios were developed for testing as follows:
- HEP Scenario – the 2017 Planning Consent
 - Core Gravity Scenario – the planned sustainable transport strategy and mode share strategy built around a 3-shift working pattern in an advanced manufacturing facility (informed by the operation of similar UK sites).
 - Business as Usual / Fail Scenario- the proposed scheme using the HEP -based (2017 Planning Consent and more car-dependent mode share assumptions).
- 9.4.23 Whilst the TA includes additional analysis on these three alternative development scenarios, the assessment in this Chapter is based on the 'Core Gravity' scenario with the associated Proposed Development trip generation calculated for direct comparison with the 2032 baseline.
- 9.4.24 Since the LDO is a market facing flexible consent in terms of actual land uses implemented, Gravity has been assessed for a most likely outcome 'Core Gravity' scenario which reflects the land uses and operations as below:

- Gravity will provide up to 1,000,000 sqm of Advanced Manufacturing floorspace creating 6,098 jobs, 65,000 sqm of supporting employment uses and 35,000 sqm of supporting ancillary uses, creating another 1,402 jobs combined.
- The Site will operate on a 24/7 basis for 365 days per annum. A three-shift system for the advanced manufacturing will operate between 06:00-14:00, 14:00-22:00 and 22:00-06:00. The supporting ancillary uses are expected to operate around a similar basis to the three-shift advanced manufacturing activity on site.
- 90% of advanced manufacturing type jobs are assumed to work the three-shift system, with the remaining 10% assumed to work 09:00-17:00 hours.
- The advanced manufacturing is assumed, based on a first principles assessment which is set out in the TA, to generate circa 445,000 units output per annum, and HGV movements have been estimated on this basis.
- 750 residential units with an assumed split of 10% 1 bed, 20% 2 bed, 50% 3 bed and 20% 4 bed.
- Allowances have been made for trip internalisation on the basis that the Smart Campus will encourage cross visitation (supply chain) between land uses and therefore the Site will achieve a level of self-containment which in turn will minimise external trip making. These details are set out in the TA.

9.4.25 Scenario testing identified that a mode share of 65% car driver could be achieved in the 'Core Gravity' scenario by a range of different potential future transport outcomes. The scenario assumptions around a supporting transport strategy and transport mitigation measures are summarised below:

- a package of incentives to encourage cycling and enhanced infrastructure including the A38 corridor scheme and A39 route to Bridgwater Station.
- incentives for employees / residents to use public transport / and or cost on the employee for parking on site.
- Enhanced main A38 corridor bus services and bespoke, dedicated, Demand Response Transit (DRT) minibus / e-bus services for employees geared to align with shift patterns, funded by the investment plan and overseen or commissioned by the transport authority or occupier.
- Incentivised car share system.
- Associated trip internalisation factors.
- Comprehensive package of transport planning measures and monitoring (as set out in more detail in the FTP) to achieve the core target modal share of 65% car driver.

9.4.26 Daily HGV generation for Gravity has been estimated using a first principles approach based on the likely manufacturing output of the development.

9.4.27 For the purposes of the EIA, it has been assumed (as a worst case in terms of traffic impact) that the potential passenger and / or freight rail facility may not be delivered. It is however expected that this facility will be in place and could lead to reductions in staff and freight traffic movements although such reductions are not accounted for in this assessment. The DCMS 5G project is considering the application of 5G technology to logistics movements and may have a role in freight management through implementation relating to the efficient operation of the highway network and the tracking of goods.

- 9.4.28 It should be noted that the construction impacts associated with the rail proposals have been included to represent a worst case construction impact assessment.

Limitations

- 9.4.29 The road safety review undertaken covers the most recent 5 year period available, but in doing so, includes the period between March-December 2020 when the Government imposed a Covid-19 lockdown period and 'normal' travel patterns were disrupted.
- 9.4.30 Due to the limitations on movement implemented by the Government in response to the Covid-19 pandemic, it has not been possible to collect a full set of representative travel data at this time (i.e. between March 2020 and Spring 2021). Pre-COVID travel data originating from several data sources related to different years has been used to create a 2018 baseline scenario for the purposes of this assessment from which a 2032 future year baseline scenario has been derived.
- 9.4.31 SDC commissioned the development of an area wide transport model in August 2019. It was originally planned to use this SDC transport model for both the baseline and future year forecasts to assess the Gravity development impacts. This has not, however, been possible as it became evident that the model would not be available within the required timescales due to the data collection limitations described above. The model remains in development and unavailable for use. The same situation arose when considering the potential use of other traffic only models owned by NH and SCC, hence it has not been possible to use an area wide multi-modal transport model for the assessment.
- 9.4.32 Stantec has therefore used the 2018 baseline datasets as the basis for 2032 future year baseline forecasts based on the application of growth factors developed from the National Trip End Model and TEMPro dataset combined with specific site generation forecasts.
- 9.4.33 The assessment undertaken assumes that the provision of the Gravity Link Road will lead to some redistribution of local traffic flows in and around the village of Puriton. The redistribution assessment has been based on traffic using the most logical route post opening of the Gravity Link Road scheme.
- 9.4.34 The methodology used to inform this ES chapter provides a robust assessment of the likely effects of the Proposed Development on the environment surrounding the Site and is based on the approach set out in the ES Scoping Report and the November 2020 Transport Assessment Scoping Report.

9.5 Baseline Conditions

- 9.5.1 This section identifies the baseline conditions of the study area from a traffic and transport perspective, for both the 'Current State of the Environment' and '2032 Baseline' scenarios.

Current State of the Environment

- 9.5.2 The Site benefits from an established access onto Woolavington Road in the form of Y-shaped twin priority junctions where the Eastern and Western Approach Roads link to form a single point of entry to the 37 Club and main site. A secondary vehicular access connects the Site with the B3139 to the east.
- 9.5.3 Several transport related elements of the Extant Consent in relation to access have been implemented as follows:
- New main site access roundabout on Woolavington Road.

- Gravity Link Road access directly from the Site access roundabout onto the A39 Puriton Hill to the south and the associated new roundabout / improvements to the A39 junctions with Hillside and Hall Road.
 - A new 'green bridge', connecting Puriton with the land to the south along a Public Right of Way (PROW).
- 9.5.4 Construction of the proposals listed above is ongoing and scheduled to be completed and opened in October 2021.
- 9.5.5 Whilst the principle function of the Gravity Link Road is to provide a strategic access to the Site, it will also provide additional local benefits including:
- The provision of access, highway and safety improvements at the existing junctions of Hall Road, Old Puriton Hill and Hillside.
 - Restriction of HGV traffic through Puriton and Woolavington villages.
 - Reduced through traffic movement in Puriton.
 - Facilitate public realm and complementary traffic management measures in Puriton and Woolavington villages, and Woolavington Road.
 - Improved connectivity, accessibility and general safety for pedestrians and cyclists and public transport users.
- 9.5.6 In addition, an improvement of Junction 23 of the M5 has been completed and enhanced beyond what was required for the 2017 Planning Consent.

Local Facilities

- 9.5.7 Within the vicinity of the villages of Puriton and Woolavington, there is Court Farm Butchers in Puriton, located on Riverton Road, which also provides grocery needs, and Co-op Food on Woolavington Hill, with shops providing day to day convenience goods for local residents. A post office is also located on Middle Street within the centre of Puriton. The nearest supermarkets to the villages are in Bridgwater, with Budgens situated adjacent to Bristol Road or Sainsburys accessed from The Clink.
- 9.5.8 The Woolavington Branch Surgery is located in Woolavington off Woolavington Road to the east of the current site access. Bridgwater Hospital is located on the north eastern edge of Bridgwater and has an Accident and Emergency centre. The nearest dental facility is 'myDentist' located on Symons Way, Bridgwater.
- 9.5.9 There are primary schools located in both Puriton and Woolavington. Puriton Primary School is accessed via Rowlands Rise, which contains wide footways on both sides of the carriageway. Woolavington Village Primary School is located on the southern side of Higher Road, has limited car parking facilities and is only served by footways to the east. The closest secondary schools are Chilton Trinity and Bridgwater College Academy, both of which are located within Bridgwater.
- 9.5.10 The National Cycle Network Route extends to the east of Woolavington and north of the Site to Highbridge and is accessible via Cossington Lane. Furthermore, Puriton Sports Centre and the 37 Sports and Social Club can be accessed via Batch Road and Woolavington Road respectively.

Walking and Cycling

- 9.5.11 The Site lies within open countryside between the villages of Puriton and Woolavington. The semi-rural location is reflected in the current accessibility of the Site to local facilities and services within reasonable walk distance. Bridgwater provides the nearest settlement for access to higher order facilities and services.
- 9.5.12 The footway network reflects the rural character of both villages of Puriton and Woolavington. Footway provision sometimes lacks consistency with narrow or no footway in places, with one formal crossing point in each village. However, the Village Enhancement Schemes to be delivered as part of the 2017 Planning Consent (discussed below) will help to address some of these local connectivity issues within and between the two villages.
- 9.5.13 There are no formal cycle paths in the immediate vicinity of Puriton and Woolavington, however National Cycle Network Route (NCNR) 3 runs under A39 Bath Road adjacent to Woolavington Hill and later connects to NCNR 33, which runs to the east of Woolavington and beyond into Highbridge.
- 9.5.14 There is currently an absence of formal footways or cycleways adjacent to Woolavington Road, therefore access by these modes between the Site and the local villages of Puriton and Woolavington where there are some local facilities available could be improved. The proposed Village Enhancement Scheme addresses these local connectivity issues within and between the two villages.
- 9.5.15 There is a single public right of way (PROW) that crosses the Proposed Development: the Gravity Link Road crosses the alignment of public footpath BW 28/2 and this has been considered and appropriately incorporated into the associated Gravity Link Road designs with the provision of a new green bridge to retain this existing connection.
- 9.5.16 Additional PROWs that run adjacent to the Site and remain unaffected by the Proposed Development include public footpaths BW 37/2 and BW 28/4; public bridleway BW 28/1; and restricted byway 28/1/1.

Puriton

- 9.5.17 Pedestrian footways are provided on at least one side of the carriageway for the length of Hall Road, which also includes a pedestrian crossing adjacent to the Village Hall bus stop prior to forming Riverton Road. Level and adequately surfaced footways then continue on at least one side of the carriageway through Puriton, with dropped kerbs and tactile paving at crossing points such as Rowlands Rise and the Butchers Shop.
- 9.5.18 Puriton Primary School is accessed via Rowlands Rise, which has wide and well surfaced footways on both sides. Between the Butchers Shop and Hillside the footway on the eastern side of the carriageway is narrow and there is no footway on its western side.
- 9.5.19 Hillside is served by footways on at least one side of the carriageway until Cypress Drive. However, during a short section of the AM peak it experiences high levels of on street parking linked to the Primary school drop off.
- 9.5.20 Woolavington Road, east of Hillside, is served by wide footways on at least one side of the carriageway with dropped kerbs and tactile paving at informal crossing points. The footways end to the east of Puriton Park.

Woolavington

- 9.5.21 There is currently only one formal pedestrian crossing point on Woolavington Hill B3141 prior to the junction with Higher Road and Vicarage Road. However, there are several informal dropped kerb pedestrian crossing points, but these do not have tactile paving.

- 9.5.22 To the west of Lynham Close, there are no footways on either side of the road along Woolavington Road. To the east, there is a footway on the northern side of the carriageway until Chertsey Close, where a crossing with tactile paving is provided to the footway on the southern side of Higher Road, which continues to the junction with Woolavington Hill, except for a section in front of Woolavington Village Primary School. A crossing with tactile paving is provided by 'The Green' bus stops.
- 9.5.23 Along Woolavington Hill, south of the junction with Higher Road, there are footways provided on both sides of the carriageway. The footways continue until the southern junction with Old Mill Road where a footway is only provided on the eastern side of the carriageway, until the footway comes to an end at Cossington Lane.
- 9.5.24 Along the B3141, north of the junction with Higher Road footways are provided on at least one side of the carriageway for the majority of the route, except for a short section south of the junction with Church Street. The footways provided are narrow in parts along Lockswell with limited crossing points.

Village Enhancement Scheme (VES) Overview

- 9.5.25 The Section 106 Agreement for the 2017 Planning Consent includes the requirement to deliver a VES within and between the villages of Puriton and Woolavington as additional works to construction of the Gravity Link Road.
- 9.5.26 Following a public consultation event held in March 2020, a VES scheme has been developed and has achieved planning consent under planning reference 42/20/00022. Technical approval submissions are to be made prior to scheme delivery. The 2017 Planning Consent Section 106 states that the VES shall be completed within 12 months after completion of the Gravity Link Road or within 6 months of commencement of the VES if earlier (unless agreed otherwise).
- 9.5.27 A high-level overview of the VES proposals for Puriton and Woolavington has been set out below, and further details are set out in the TA.
- 9.5.28 The VES will provide safe and sustainable connections between the villages of Puriton and Woolavington. The VES includes traffic calming measures and a new off-road shared foot / cycleway path between the two villages whilst connecting to the Site and the 37 Club.
- 9.5.29 The VES aims to provide a safe and attractive route for walking, cycling and micro-mobility modes of transport, reduce traffic speeds via traffic calming measures, and improve highway safety within the villages of Puriton and Woolavington. The measures will also encourage drivers to use the Gravity Link Road as the preferred route into the Site for vehicular traffic and encourage pass-by traffic to use this new link as an alternative to routing through Puriton.

Public Transport

- 9.5.30 The data below relates to pre-Covid 19 travel restriction measures. Some bus services have reduced frequency during the pandemic, but it is expected that these will return to 2019 service levels in due course.
- 9.5.31 Bus stops through the centre of both villages are serviced by the 75 bus service from Wells to Bridgwater 7 times a day from 07:45 to 18:27. The 66 and X75 buses operate a singular daily service in each direction from Axbridge to Bridgwater College and Wells to Bridgwater College respectively, as shown in **Table 9-5**.
- 9.5.32 Recent on-site observations also identified that private school buses operated in the morning and afternoon peaks, servicing secondary schools outside of both Puriton and Woolavington.
- 9.5.33 Outside of the immediate vicinity of the Site, additional bus services are accessible from the A38 bus stops at Downend Road and Admirals Table, located approximately 2.5km and 2.8km

respectively from the Site. From these stops, buses 21, 21A and 62 are available. Service 21 and 21A operate between Taunton and Highbridge and are accessible every hour. Service 62 is a school service between Bridgwater College and Weston-super-Mare, which operates one service a day in each direction.

Bus	Service	Frequency
66	Axbridge – Bridgwater College	1 school service a day in each direction
75	Wells – Bridgwater (loop)	7 services per day
X75	Wells – Bridgwater College	1 school service a day in each direction

Table 9-5 Local Bus Services

- 9.5.34 A wider range of bus services are available from Bridgwater Bus Station, which is accessed off Watsons Lane in central Bridgwater. **Table 9-6** shows the services available from the Bridgwater Bus Station.

Operator	Service	Frequency
Megabus UK / National Express	Bridgwater – Bristol	44 services a day
Megabus UK / National Express	Bridgwater – Plymouth	27 services a day
Megabus UK / National Express	Bridgwater – Heathrow	16 services a day
National Express	Bridgwater – Birmingham	10 services a day
Megabus UK / National Express	Bridgwater – Barnstaple	8 services a day
National Express	Bridgwater – Taunton	6 services a day

Table 9-6 Bridgwater Bus Station Departures

- 9.5.35 The Sedgemoor area is also covered by the SLINKY demand responsive service, operated by Mendip Community Transport under contract to SCC. This service operates between 09.00 and 18.00 on Monday to Friday and carries any passenger with a transport need, be it through disability or no access to conventional public transport. The service is operated with one wheelchair accessible minibus.
- 9.5.36 The closest railway station to the Site is Bridgwater Station, located on the Taunton to Bristol mainline. The station itself is located in Bridgwater town centre on Wellington Road, approximately 7km from the Site. The station has recently been refurbished under the SDC Celebration Mile scheme and consists of a ticket office, car park for 36 cars operated by APCOA, cycle parking for 20 bikes, a taxi rank, collection points for pre-purchased tickets, toilets, CCTV and step free access to platform 1. The station provides hourly services to

Taunton and Bristol Temple Meads, with 2 services per hour between 0600-0800 and 1900-2100.

Highway Network

- 9.5.37 The Site and both Puriton and Woolavington villages can be accessed via the A39 with Puriton on the eastern side of the M5 and Woolavington further to the east, with Woolavington Road connecting the two villages.
- 9.5.38 The A39 provides strategic connectivity to the M5 corridor providing access to Bristol within 45 minutes and other economic centres of Taunton and Exeter within approximately 15 minutes and 50 minutes respectively. M5 Junction 23 also provides easy access to the A38, which is part of the SCC Major Road Network, via the Dunball Roundabout. Junction 23 has been modified and upgraded to signal control through the mitigation agreed for the Hinkley C project to create additional capacity.
- 9.5.39 The village of Puriton is currently accessed from the A39 via Hall Road, Hillside (and previously Puriton Hill prior to construction of the Gravity Link Road). However, the Gravity Link Road will provide for a new roundabout access from the A39 joining with Puriton Hill, with Hillside forming a new junction onto the access road and stopped up at the former A39 junction. Hall Road will be limited to left turn in movements only from the A39. Hall Road leads on to Riverton Road, and then forms Woolavington Road at the junction with Middle Street and Rye. Woolavington Road aligns to the south forming a junction with Hillside and continues east to Woolavington approximately 2km from the centre of Puriton.
- 9.5.40 Woolavington Road provides the westerly access to Woolavington before forming Higher Road, which passes Woolavington Village Primary School. The centre point of the village is the crossroads between Higher Road / B3141 Causeway / Vicarage Road and Woolavington Hill. Causeway provides connections to East Huntspill and then Highbridge to the north.
- 9.5.41 Woolavington Hill provides the access to Woolavington from the south. Woolavington Hill forms junctions with Old Mill Road connecting to the residential area to the south west of the village. Woolavington Hill also connects to Cossington Lane, providing access to the small village of Cossington to the east and also continues south to the A39 Bath Road leading towards Street.
- 9.5.42 There are two existing traffic calming build outs on Woolavington Road; one located between the junctions with Old Mill Road, the other to the north of the junction with Combe Lane. The Gravity Link Road will connect the A39 directly to the Site via a new roundabout on Woolavington Road.

Personal Injury Collision Analysis

- 9.5.43 Personal Injury Collision (PIC) data was obtained from SCC for a period of 5 years (01/01/2016-31/12/2020) for the local road network in the vicinity of the Site including Puriton and Woolavington, the main routes in / out of Bridgwater and the M5 Junction 23 roundabout circulatory. The Bridgwater element of the study area includes the A39 Puriton Hill, A39 Bath Road and A38 Bristol Road as well as the local road network providing access to various services and amenities in the town centre.
- 9.5.44 Data provided by the 'Crashmap' website has also been considered in relation to the Junction 23 slip roads. An overview of the findings is set out below for both the local and strategic road networks, and more detailed analysis is provided in the TA supporting the LDO.

Local Road Network

- 9.5.45 A total of 208 collisions were identified within the study area, of which 187 resulted in slight injury, 20 in serious injury and 1 fatality. A breakdown of collisions by location is summarised in **Table 9-7** below.

	Puriton and Woolavington	Batch Road and Highbridge	Bridgwater Key Links	Total
Slight	16	18	153	187
Serious	2	1	17	20
Fatal	0	1	0	1
Total	18	20	170	208
Cumulative Total	208			

Table 9-7 Personal Injury Collision (PIC) Data Summary (Local Road Network)

- 9.5.46 Within Puriton and Woolavington, 18 collisions were recorded over the 5-year period. Of these collisions, two were classified as serious and the remaining 16 reported slight casualties. The majority of collisions involved motor vehicles; however one involved a pedestrian and two involved a cyclist, all of which were classified as slight. Overall, the data suggested that the collisions are likely to have been caused by driver error.
- 9.5.47 Within the Bridgwater study area, a total of 170 collisions were recorded between 1st January 2016 to 31st December 2020. Of these collisions, 17 were classified as serious and 153 were classified as slight. There were no fatalities over the five-year period. Of all 170 total collisions, 32 involved cyclists and 30 pedestrian casualties were recorded.
- 9.5.48 The analysis identified some collision cluster sites at the junctions linking Puriton to the A39 Puriton Hill, in addition to the existing A38 Dunball and Cross Rifles Roundabouts. Whilst most collisions are likely to have been caused by driver error, it is notable that the cluster sites identified are already planned for improvement in the future. The Gravity Link Road scheme includes improvements to the A39 junctions for accessing Puriton. The VES proposals will deliver localised highway safety improvements in Puriton and Woolavington. The A38 Dunball Roundabout has funding allocated for an upgrade as previously explained, and the Cross Rifles roundabout on the northern side of Bridgwater is also being considered for improvement by SDC and SCC.

Strategic Road Network

- 9.5.49 Comparable data for the same time period as assessed for the Local Road Network demonstrates one collision cluster site which is located at the southbound off slip. The Crashmap data indicates that a total of 5 'slight' collision have occurred on the southbound off slip, all close to the entry to the Junction 23 roundabout circulatory.
- 9.5.50 All but 1 of the 5 'slight' collisions recorded appear to have occurred prior to the recent Junction 23 improvement scheme being completed. This suggests that the improvements made at the junction have served to improve road safety.

2018 Baseline Flows

- 9.5.51 2018 flows have been used to inform a baseline review of the Current State of the Environment due to the limitations collecting more recent data because of restrictions on movement implemented by the Government in response to the Covid-19 pandemic, as explained under assessment limitations.
- 9.5.52 **Table 9-8** shows the two-way 18-hour AAWT traffic flows for 'all vehicles' and HGVs for the 2018 baseline scenario.

9.5.53 Due to the imminent opening of the Gravity Link Road and to enable comparison with future scenarios, the 2018 baseline traffic data has been reviewed and localised reassignment of Woolavington Road traffic to use the Gravity Link Road (as opposed to routing toward the A39 via Puriton) has been derived.

Link Ref	Link Description	2018 Baseline Total Vehicles (Two Way)	2018 Baseline HGVs (Two Way)	2018 HGV Percentage Composition
Link 1	Link Road – Between Gravity Site and Entrance Roundabout	35	2	6%
Link 2	Gravity Link Road – Between Entrance Roundabout and Hillside	553	0	0%
Link 3	Gravity Link Road – Between Hillside and A39	1,805	14	1%
Link 4	Woolavington Road – Between Entrance Roundabout and Proposed Residential (Secondary) Access	2,501	111	4%
Link 5	Woolavington Road – Between Proposed Residential (Secondary) Access and Woolavington Primary School	2,800	100	4%
Link 6	Woolavington Road – Between Woolavington Primary School and B3141 / Woolavington Hill Crossroads	2,800	100	4%
Link 7	B3141 Causeway	3,648	102	3%
Link 8	B3141 Woolavington Hill	7,403	186	3%
Link 9	Woolavington Road – West of Entrance Roundabout (Puriton)	2,354	115	5%
Link 10	A39 – East of Puriton Hill Roundabout	14,348	676	5%
Link 11	A39 – Between Puriton Hill Roundabout and M5 Junction 23	16,008	1,157	7%
Link 12	M5 Motorway – Mainline North of Junction 23	82,849	9,316	11%
Link 13	M5 Motorway – Mainline South of Junction 23	72,103	7,519	10%
Link 14	A38 – Between Junction 23 and Dunball Roundabout	21,960	2,045	9%
Link 15	A38 – North of Dunball Roundabout	9,720	571	6%
Link 16	A38 – South of Dunball Roundabout	25,479	2,338	9%

Table 9-8 2018 Baseline 18-Hour AAWT Traffic Flows

2032 Baseline

- 9.5.54 A 2032 baseline scenario of forecast traffic flows has been created by applying generalised growth to the 2018 base traffic flows and taking account of a number of specific development proposals as considered in turn below. This approach ensures that future traffic growth associated with the committed developments are factored into the 2032 baseline, and therefore the assessment of likely significant cumulative effects with these developments is inherent to the assessment and is not reported separately.

General Traffic Growth

- 9.5.55 As traffic levels could increase by 2032, the 2018 base traffic flows do not provide a robust baseline for the assessment of the Proposed Development. Therefore, the future baseline has accounted for traffic growth using TEMPro which has been based upon demographic changes and planned development forecasts in the Sedgemoor area.
- 9.5.56 Traffic growth factors for the weekday AM and PM peak hours have been derived for Sedgemoor using TEMPro. To avoid any double counting of traffic within the assessment, the default planning assumptions were adjusted to remove housing associated with four committed development sites explicitly assessed using respective TA vehicle trip generations. It was also necessary to ensure that the planning assumptions reflected the housing and jobs growth targets / trajectories set out in the SDC Adopted Local Plan. Jobs associated with the 2017 Planning Consent were not included in the Local Plan targets so no adjustment in this regard was required. All growth factors were however adjusted with the National Traffic Model database as is standard practice.
- 9.5.57 The 2018-2032 TEMPro growth factors used in the assessment for each road type are set out in **Table 9-9**.

Time Period / Road Type	Motorway	Principal	Minor
AM Peak	1.281	1.184	1.183
PM Peak	1.277	1.181	1.179

Table 9-9 2018-2032 TEMPro Growth Factors

Extant Consent including the Gravity Link Road and VES

- 9.5.58 The vehicle trip generation assessment for the 2017 Planning Consent, as approved under application reference 42/13/00010, included the safeguarded land element³ even though it did not form part of the application at the time.
- 9.5.59 This led to a robust assessment of potential trip generation, but since there is no certainty in the delivery of outcomes relating to land without consent (safeguarded for energy, leisure and rail restoration), the 2017 Planning Consent vehicle trip generation has been adjusted by removing the safeguarded land for inclusion within the 2032 Baseline within this assessment (see **Table 9-10**).

³ Safeguarded land: 38.74 ha of energy generation uses, 11.22 ha of leisure / community uses and the rail head

	Trips In	Trips Out	Total Trips
Total Vehicles AM Peak	922	445	1,367
Total Vehicles PM Peak	350	836	1,186
Total Vehicles 18hr	5,460	5,495	10,955
Total Vehicles 24hr	5,602	5,596	11,198
Total HGVs AM Peak	62	80	142
Total HGVs PM Peak	39	30	69
Total HGVs 18hr	434	472	906
Total HGVs 24hr	445	481	926

Table 9-10 Adjusted Extant Consent Vehicle Trip Generation

9.5.60 The light vehicle trips generated by the 2017 Planning Consent have been distributed and assigned to the highway network based on demographic and travel time data using a spreadsheet based tool developed specifically for assessing the Proposed Development, which has been described previously, and is explained in more detail within the TA.

9.5.61 The HGV trips generated by the 2017 Planning Consent have been distributed and assigned in accordance with the following details which remain as agreed for the TA supporting the 2017 Planning Consent :

- 50% M5 North via Junction 23 towards Bristol
- 40% M5 South via Junction 23 including:
 - 10% to Junction 24 at Bridgwater
 - 10% to Junction 25 at Taunton
 - 20% towards Exeter
- 5% towards Hinkley Point via the A38 Bristol Road
- 5% towards Glastonbury via the A39

9.5.62 There is potential for some existing local road traffic around Puriton to be reassigned across the network with the Gravity Link Road delivered. In the absence of a strategic traffic model, the following approach has been adopted to account for this:

- Traffic into Hall Road: all left turn in traffic still uses Hall Road, but right turn in traffic adjusted to route via the A39 Gravity Link Road Roundabout and Puriton Hill.
- Traffic out of Hall Road: adjusted to all route via Puriton Hill and the A39 Gravity Link Road Roundabout.
- Traffic using the existing Puriton Hill: adjusted to all route via the new Puriton Hill and the A39 Gravity Link Road Roundabout.
- Traffic using Hillside: still route via Hillside but adjusted to join the Gravity Link Road to access A39.
- Traffic using the existing site access: adjusted to route via the new site access roundabout on Woolavington Road.

Specific Committed Development Sites

9.5.63 Four specific local committed development sites have been incorporated into the 2032 baseline. The Sites are:

- Land off Woolavington Road, Puriton – application reference 42/20/00014 – for up to 120 dwellings
- Land to the South of Sedgemoor Way, Woolavington – application reference 54/19/00008 – for up to 175 dwellings
- Land off Cossington Lane, Woolavington – application reference 54/19/00009 – for up to 145 dwellings
- Land off Woolavington Road, Woolavington – application reference 54/19/00010 – for up to 95 dwellings

9.5.64 The trip generation, distribution, and assignment for each of the committed development sites identified have been based on the details set out in the respective planning application TA's.

Hinkley Point C

9.5.65 The EDF website confirms that the final investment decision and the start of construction at Hinkley Point C took place in the second half of 2016⁴. Press statements from EDFE confirm that Hinkley Point C is anticipated to be completed around June 2026⁵, with the former position being 2025 in line with the energy white paper.

9.5.66 It is therefore necessary for the 2032 future baseline traffic flows to include movements generated by Hinkley Point C during the operational phase, but also to exclude all movements related to the construction phase which are inherently included within the 2018 baseline traffic flows used within this assessment.

⁴ <https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/about>

⁵ <https://www.bbc.co.uk/news/uk-england-somerset-57227918#:~:text=Hinkley%20C%20is%20due%20to,%C2%A322bn%20and%20%C2%A323bn.&text=The%20new%20roles%20will%20bring,%C2%A322bn%20and%20%C2%A323bn.>

- 9.5.67 Hinkley Point C construction traffic at the time of the 2018 baseline traffic data was estimated through use of the data provided by NNB Generation Company (HPC) Ltd in regular monitoring reports including their quarterly report (April to June 2018) which provides data on freight, park and ride use and passenger numbers associated with the construction phase. Combining this with Stantec's knowledge of bus service routing, the Hinkley Point C construction traffic has been removed from 2018 traffic counts in the study area (prior to the application of generalised growth factors to create the 2032 future baseline as outlined above).
- 9.5.68 The likely weekday peak hour operational traffic impact associated with Hinkley Point C was assessed within the 2017 Planning Consent TA and the source data used at that time was supplied by SCC. For the purposes of this assessment, the same operational traffic movements assessed previously have been incorporated into the 2032 baseline for this assessment (see **Table 9-11**).

	M5 Mainline Motorway Links	A39 Road Links	A38 Road Links	Various Minor Road Links
Peak hour to 18-hour Factor	6.66 (M5 North) / 6.44 (M5 South)	5.17	4.92	Various factors ranging between 5.3 – 5.9

Table 9-11 Weekday Peak Hour to 18-hour AAWT Traffic Flow Factors

Daily and 18 Hour 2032 Baseline Traffic Flow Generation

- 9.5.69 In summary, 2032 Baseline weekday peak hour traffic flows have been derived by taking account of:
- 2018 base with general background traffic growth due to forecast changes to demographics and local development
 - Traffic reassignment arising due to the Gravity Link Road and associated local highway improvements
 - Vehicle trip generation associated with the 2017 Planning Consent
 - Committed development trip generations for 4 no local sites added
 - Hinkley Point C construction traffic (as included within 2018 base data) removed
 - Hinkley Point C peak operational traffic added
- 9.5.70 The resulting 2032 baseline weekday peak hour traffic flows have been assessed against traffic flow data sourced from available ATC surveys and Webtris traffic data. This enabled factors to be calculated to estimate 18-hour AAWT traffic flows from the peak hour traffic flows for each different road type within the study area. **Table 9-12** provides a summary of the different road type factors derived.

	M5 Mainline Motorway Links	A39 Road Links	A38 Road Links	Various Minor Road Links
Peak hour to 18-hour Factor	6.66 (M5 North) / 6.44 (M5 South)	5.17	4.92	Various factors ranging between 5.3 – 5.9

Table 9-12 Weekday Peak Hour to 18-hour AAWT Traffic Flow Factors

9.5.71 **Table 9-13** shows the resulting 18-hour AAWT two-way flows presented as ‘all traffic’ and HGVs on links within the study area.

Link Ref	Link Description	2032 Baseline Total Vehicles (Two Way)	2032 Baseline HGVs (Two Way)	2032 Baseline HGV Percentage Composition
Link 1	Link Road – Between Gravity Site and Entrance Roundabout	10,855	908	8.4%
Link 2	Link Road – Between Entrance Roundabout and Hillside	8,832	906	10.3%
Link 3	Link Road – Between Hillside and A39	10,313	923	8.9%
Link 4	Woolavington Road – Between Entrance Roundabout and Proposed Residential (Secondary) Access	4,937	131	2.6%
Link 5	Woolavington Road – Between Proposed Residential (Secondary) Access and Woolavington Primary School	5,290	119	2.2%
Link 6	Woolavington Road – Between Woolavington Primary School and B3141 / Woolavington Hill Crossroads	5,290	119	2.2%
Link 7	B3141 Causeway	5,147	120	2.3%
Link 8	B3141 Woolavington Hill	9,887	220	2.2%
Link 9	Woolavington Road – West of Entrance Roundabout (Puriton)	3,432	136	4.0%
Link 10	A39 – East of Puriton Hill Roundabout	17,504	845	4.8%
Link 11	A39 – Between Puriton Hill Roundabout and M5 Junction 23	26,567	2,230	8.4%
Link 12	M5 Motorway – Mainline North of Junction 23	110,668	12,373	11.2%
Link 13	M5 Motorway – Mainline South of Junction 23	95,164	9,983	10.5%
Link 14	A38 – Between Junction 23 and Dunball Roundabout	28,622	2,465	8.6%
Link 15	A38 – North of Dunball Roundabout	11,640	676	5.8%
Link 16	A38 – South of Dunball Roundabout	32,218	2,811	8.7%

Table 9-13 18-hour AAWT 2032 Baseline Two-way Traffic Flows

9.6 Embedded Mitigation

Construction Phase

9.6.1 The construction traffic effects will be managed through a Framework Demolition and Construction and Environmental Management Plan (FDCEMP), including appropriate plans for the management of construction traffic, submitted with this ES and provided at **Appendix 4.1**.

- 9.6.2 The completion of the delivery of the Gravity Link Road and associated highway works and the VES scheme will help by providing a new direct link into the Proposed Development from the A39 Puriton Hill and M5 Junction 23 bypassing local villages.

Operational Phase

- 9.6.3 The Proposed Development will create a low carbon smart campus generating between 4,000 and 7,500 new skilled jobs, providing both a strategic economic stimulus to drive economic renewal, shaping and connecting to a green supply chain across the UK. Home to international business, start-ups and SMEs, Gravity will be a home for Clean Growth and green industries, creating the space to innovate and create green solutions from energy solutions to smart mobility. Uses and job numbers will follow business occupier, therefore the plan, monitor and manage approach is going to be key in active management and mitigation planning.
- 9.6.4 The transport proposals put forward in support of development at Gravity aim at delivering a framework for access and movement that is deliverable and effective based on current technologies, but so that they are also resilient to changing travel patterns and systems. This inherent mitigation approach (effectively a mitigate at source approach) has been carried through to the forecasting approach.
- 9.6.5 The Transport Movement Strategic and Transport Movement Micromobility Parameter Plans in **Appendices 3.1b & c** are described in **Chapter 3** and illustrate the principal proposals to be delivered to support access and movement into and around the Proposed Development within the Site. As shown on the Parameter Plans, proposals allow for a degree of flexibility to enable detailed elements to respond to operator(s) requirements.
- 9.6.6 This includes potential secondary access locations as illustrated on the Transport Movement Strategic Parameter Plan, with up to four secondary access locations proposed from Woolavington Road to provide potential access to development plots incorporating new points of access to the south-west and south-east of the Site and re-use of the existing site Eastern and Western approach access junctions.
- 9.6.7 The general approach to access and movement focuses on the following themes.

Reducing the Need to Travel

- Flexible or remote working practices and technological solutions including video conferencing and online collaboration will be available to employees where possible. Flexible working arrangements allow for the opportunity to travel a little earlier or later than normal to fit in with bus or train times or to avoid the busiest time on the road, saving both time and fuel.
- Job creation will create a legacy opportunity for labour transition from Hinkley Point C to avoid longer distance travel to find alternative work, for example at Sizewell.
- The campus will operate on a 24/7 basis, 365 days per annum.
- Up to 750 residential units are to be delivered that are intended to primarily serve as housing for employees at the Site.
- The campus will include work hubs which will help to further reduce the overall need to travel off the Site for some trip purposes.

Reducing Travel Distances

- The creation of 7,500 new skilled jobs at Gravity should reduce the need for the local residents of Bridgwater and its surrounding areas to travel to larger settlements such as the cities of Bristol and Exeter for access to better skilled work opportunities.

Improving Access and Choice for Pedestrian Movement

- All streets are to have a minimum of a dedicated footway and safe pedestrian routes throughout the development to promote pedestrian movement.
- Pedestrian connections from Puriton and Woolavington are to be designed for inclusivity and permeability.
- Mobility on site will be impacted positively by adoption of the design principles around waste and resource management. This is because reducing waste will reduce service movements and through a co-ordinated management process throughout the development efficiencies will also be realised, reducing any conflict between servicing requirements and non-motorised user requirements.

Improving Access and Choice for Cycle Movement

- Provision of off-site cycle route improvements as part of the Gravity Link Road and the VES will facilitate and encourage trips to the Site by bike (also included in the baseline scenario).
- All streets to incorporate high quality cycling provision (segregated where possible) to facilitate and encourage trips by bike.
- Provision of accessible, safe, secure and sheltered cycle parking facilities at key destinations throughout the Site.
- Provision of cycle equipment storage, maintenance, changing and shower areas across the Site in appropriate areas.

Introducing New and Innovative Micromobility Measures

- Implementing micromobility solutions such as escooters for people and goods through the Site will reduce the need to use private cars and HGV / LGV movement.
- Mobility hubs will provide facilities including e-scooter/bike charging, parcel stores, e-car clubs, sheltered waiting areas, live travel data etc
- Provisions for the use of scooters and e-bikes will be built into the scheme from an early stage.

Improving Local Bus / Public Transport Connectivity

- External bus routes will be able to enter the Site via the new access road or existing connections on Woolavington Road.
- It is anticipated that as the Site develops, provision for new or higher frequency services including zero emission (and potentially autonomous) Demand Responsive Transport (DRT)⁶ vehicles will be made as part of the mobility package.
- Streets have been developed as a flexible grid to allow for scalable mass mobility solutions within the Site.

⁶ DRT is a form of shared private or quasi-public transport for groups travelling where vehicles alter their routes each journey based on particular transport demand without using a fixed route or timetabled journeys. These vehicles typically pick-up and drop-off passengers in locations according to passengers needs and can include taxis, buses or other vehicles.

- In the early phases, an electric / alternative fuel bus loop will distribute people around the Site in an expedient manner.

Reconnecting the historic rail link

- Proposals to re-open the disused rail line connecting to the main Exeter-Bristol line could facilitate both passenger and rail freight services. These could potentially significantly reduce HGV movements to/from the Site as well as reduce trips by car, but such reductions have been excluded from the assessment on the basis as delivery remains subject to the confirmed requirements of the end site occupier.
- Should the rail proposals come forward and noting concerns raised by NR in their consultation response in relation to the existing local level crossing, it is proposed that improvements to the existing level crossing will be incorporated to upgrade the existing crossing despite minimal development impacts.
- It is also recognised that the rail proposals could require the replacement of the existing M5 rail bridge. Should this be required it would be subject to agreeing associated M5 traffic management measures and approvals.

Parking Management Principles

- Opportunities will be sought to develop consolidated parking hubs to make efficient use of land and integrate EV charging.
- On-plot parking is to be minimised and where utilised must be sensitively built into the development and must not be prominent from the street.
- The proposed Car Club on site will reduce the need to own a car and provide an option for car hire if essential for business trips, while EV charging points will be integrated into parking areas and / or bespoke commercial facilities.
- Designing in EV charging and smart infrastructure into design codes will ensure effective and seamless implementation

Site Wide Management

- A comprehensive approach to travel and mobility management will be implemented as part of the FTP at the development including modal share targets, measures to encourage travel by sustainable modes of transport, and a robust monitoring and review programme.
- A series of measures linked to site occupation and level/type of trips made will be introduced at certain phases including measures such as shift working patterns

Mobility as a Service (Maas)

- 9.6.8 MaaS is the term used to describe the integration of transport services into a single mobility service accessible on demand, which has the potential to accelerate a transition away from personally owned vehicles. An illustration of how a Gravity MaaS package could look is shown below.



- 9.6.9 The aim of these services is to provide an integrated end-to-end solution utilising a single platform for booking, payment and journey management. Services are designed to reduce dependence on private cars leading to greener journeys of the future by utilising the most efficient transport mode through a streamlined user experience.
- 9.6.10 The range of transport measures proposed will not all be available from day one of the development opening. There are many issues that will impact on the timing of measures becoming available including but not limited to things such as the availability of technology, demand for trips and distribution of staff, cost of equipment and operations, and the fact that different groups in society will respond to and take up new technology at differing rates. As such the route map to a mixed mobility future at the development will be both revolutionary and evolutionary.
- 9.6.11 It is therefore important that the Proposed Development is delivered in such a way that delivers sufficient flexibility and resilience so that it can adapt to the future of travel when such opportunities present themselves.

Monitor and Manage Plan

- 9.6.12 Fundamental to the success and effectiveness of the integrated mitigation measures is the requirement to set overall trip / movement targets by mode and to monitor against the effectiveness of the measures to ensure that the Proposed Development is on track to deliver against the identified targets. This will be achieved through the preparation and implementation of a monitor and manage plan.
- 9.6.13 A draft plan has been prepared (**Appendix 9.4**) as part of the governance arrangements for the delivery of the Gravity Enterprise Zone (EZ) through the LDO regime. The plan includes the monitor and manage approach which will be employed at Gravity to provide a strategic oversight of the implementation and delivery of the EZ and achieve desired outcomes and long lasting transformational benefits in the wider locality.
- 9.6.14 An overarching EZ Board will be formed, along with two sub groups, one of which will be a Transport and Infrastructure Management Group (TIMG).
- 9.6.15 The TIMG will be established to lead and co-ordinate transport and infrastructure related matters in respect of Gravity mobilisation and implementation. In particular, this will cover infrastructure delivery, and the monitoring and management of the transport effects of the

project. This will be achieved through oversight of the FTP, individual travel plans, and related construction traffic management plans.

- 9.6.16 Infrastructure may include for example, transport infrastructure including road, rail, public transport, walking and cycling, as well as EV charging, utilities e.g. grid strengthening; and digital as outlined within the investment plan) as part of the governance and infrastructure delivery arrangements for the delivery of the Gravity EZ through the LDO regime.
- 9.6.17 The funding and delivery of mitigation and wider infrastructure investment measures will be multifaceted and may come from various sources and over various timescales. This may be via Government funds, NH direct activity, local authority led bids for Community Renewal and Levelling Up Funds and the Town Deal, which may have direct and indirect effects on the Gravity project.
- 9.6.18 Arrangements for implementation of the measures referred will be found variously in the design guide, the LDO itself and any s106 agreement connected to the LDO.
- 9.6.19 The Transport authority will be an integral member of the TIMG and will be responsible for commissioning and implementing schemes and mitigation measures to improve outcomes and reduce impacts, funded via the investment plan and retained business rates from the enterprise zone. The challenge will be for the local authority to commission and deliver schemes in a timely way to manage and reduce impacts.
- 9.6.20 As local government review proceeds and a new unitary is established in 2023 it is essential to build a team to ensure continuity and to maintain momentum in delivery. There will be no separation between the planning enforcement authority, previously a district function, and the highway authority, so a one team approach will ensure a seamless approach to monitoring and management and mitigation delivery.
- 9.6.21 This broad package of transport mitigation remains subject to further consultation with key stakeholders including SDC, SCC and NH officers. They may also include additional mitigation by way of appropriately scaled financial contributions including potentially through business rate retention toward delivery of off-site transport improvements including pedestrian and cycle improvements from the Site toward Bridgwater along the A38/A39 corridors and highway safety and/or capacity improvements where necessary.
- 9.6.22 The transport mitigation package is secured through the Compliance Form.

9.7 Assessment of Likely Effects

Construction Phase

- 9.7.1 The construction of the Proposed Development would generate traffic that would affect the local road network primarily through HGV movements bringing materials in/out of the Site and construction workforce journeys to/from work on site.
- 9.7.2 The implementation of the LDO will be market-led and therefore a construction programme is not available at this time. It is however anticipated that construction will be complete by 2032 and therefore there is the potential for construction effects to be long-term but not permanent.
- 9.7.3 An appraisal of the likely trip generation has been undertaken based upon the scale of development proposed and assumed delivery programme, and it is estimated that peak construction activity would be in 2024. The appraisal has been based on a 5 day working week.
- 9.7.4 To represent a worst-case assessment, additional HGV movements associated with constructing the rail improvements have been included whilst the assessment has also not

taken into account potential opportunities to reduce HGV movements with subsequent freight transfer from road based HGV to rail movements.

- 9.7.5 It is estimated that the peak construction period could generate approximately 425 HGV two-way movements per day (18-hour period); a comparable estimate to the 2017 Planning Consent is approximately 349 HGV two-way movements per day (18-hour period).
- 9.7.6 These HGV movements are expected to be distributed onto the local road network with 90% of the HGV movements via the M5 junction 23 (70% north / 20% south), 5% onto the A39 and 5% onto the A38 toward Bridgwater.
- 9.7.7 It is also estimated that there would be up to 1,714 two-way trips from construction works generated per day (18-hour period); a comparable estimate to the 2017 Planning Consent is approximately 1,125 two-way movements per day (18-hour period).
- 9.7.8 This has assumed that approximately 85% of these workers would drive to work (single occupancy) with the balance car sharing or using alternative modes of transport. These trips have been distributed onto the local road network consistent with assumptions for operational employees for the HEP trip forecasting.
- 9.7.9 These predicted construction traffic flows are lower than the fully operational development flows considered further within the following section of this chapter.
- 9.7.10 The construction effects will be limited in time to the construction period and the majority of HGV movements limited to the Gravity Link Road, the A39 Puriton Hill, M5 Junction 23 and mainline; all links with no sensitive receptors present.
- 9.7.11 As confirmed earlier in this Chapter, the construction effects will also be managed through embedded mitigation proposals and specifically the Framework DCEMP submitted with this ES and provided at **Appendix 4.1**.

Operational Phase

- 9.7.1 **Table 9-14** below provides a summary of the assessment of operational effects by Gravity through a comparison against the 2032 Baseline scenario.

Link Ref	Link Description	2032 Baseline – Total Vehicles (Two Way)	2032 with Gravity – Total Vehicles (Two Way)	% Change	2032 Baseline – HGVs (Two Way)	2032 with Gravity – HGVs (Two Way)	% Change
Link 1	Link Road – Between Gravity Site and Entrance Roundabout	10,855	11,524	6.2%	908	673	8.4%
Link 2	Link Road – Between Entrance Roundabout and Hillside	8,832	9,919	12.3%	906	671	9.9%
Link 3	Link Road – Between Hillside and A39	10,313	11,401	10.5%	923	688	8.9%
Link 4	Woolavington Road – Between Entrance Roundabout and Proposed Residential (Secondary) Access	4,937	4,786	-3.1%	131	131	2.6%
Link 5	Woolavington Road – Between Proposed Residential (Secondary) Access and Woolavington Primary School	5,290	5,139	-2.8%	119	119	2.2%
Link 6	Woolavington Road – Between Woolavington Primary School and B3141 / Woolavington Hill Crossroads	5,290	5,139	-2.8%	119	119	2.2%
Link 7	B3141 Causeway	5,147	4,767	-7.4%	120	120	2.3%
Link 8	B3141 Woolavington Hill	9,887	10,117	2.3%	220	220	2.2%
Link 9	Woolavington Road – West of Entrance Roundabout (Puriton)	3,432	3,164	-7.8%	136	136	4.0%
Link 10	A39 – East of Puriton Hill Roundabout	17,504	17,485	-0.1%	845	833	4.8%
Link 11	A39 – Between Puriton Hill Roundabout and M5 Junction 23	26,567	27,674	4.2%	2,230	2,006	8.4%
Link 12	M5 Motorway – Mainline North of Junction 23	110,668	111,462	0.7%	12,373	12,390	11.2%
Link 13	M5 Motorway – Mainline South of Junction 23	95,164	95,313	0.2%	9,983	9,754	10.5%
Link 14	A38 – Between Junction 23 and Dunball Roundabout	28,622	28,785	0.6%	2,465	2,453	8.6%
Link 15	A38 – North of Dunball Roundabout	11,640	11,666	0.2%	676	676	5.8%
Link 16	A38 – South of Dunball Roundabout	32,218	32,355	0.4%	2,811	2,800	8.7%

Table 9-14 Assessment of Operation Effects - 18 Hour AAWT Flows

- 9.7.2 As set out in Section 9.4 of this chapter, ‘medium’ and ‘high’ sensitivity receptors are located on Link 5, accordingly with reference to paras 9.4.2 to 9.4.4 the IEMA “Guidelines for the Environmental Assessment of Road Traffic” Rule 2 applies with further assessment required only if 18-hour AAWT flow will increase as a result of the Proposed Development by 10% or more.
- 9.7.3 As confirmed above, the impacts are considerably less than 10% and accordingly the environmental effects of the development are not likely to be significant and are not subject to further assessment.
- 9.7.4 All remaining links within the Study Area are considered to be classed as ‘medium’ or ‘low’ in terms of receptor sensitivity, accordingly, Rule 1 applies with further assessment required only if 18-hour AAWT flows will increase by more than 30% (or the number of HGVs will increase by more than 30%).
- 9.7.5 Based on the results set out above, it is evident that none of the remaining links are forecast to change, either in total flow or HGV percentage terms, by 30% (rule 1). On this basis, the operational effects of the Proposed Development are not likely to be significant, and no further environmental assessment has been undertaken.

9.8 Further Mitigation

- 9.8.1 No further mitigation is expected to be required over and above the embedded mitigation described within this Chapter.

9.9 Residual Effects

- 9.9.1 The residual effects will be the same as the assessed effects on the basis that no further mitigation is required over and above the embedded mitigation described within this Chapter.

9.10 Monitoring

- 9.10.1 The operational transport effects of the proposals will continue to be actively monitored and managed through the implementation of a site wide FTP and Monitor and Manage Plan and in accordance with the wider approach described within the Embedded Mitigation section earlier in this Chapter.

9.11 Non-Technical Summary

- 9.11.1 The methodology used in this chapter has been developed to fulfil the requirements of the EIA Regulations informed by guidance set out within the following:
- “Guidelines for the Environmental Assessment of Road Traffic” (Guidance Note Number 1) published by the Institute of Environmental Assessment (now the Institute of Environmental Management and Assessment (IEMA)) in 1993;
 - Volume 11 of the Design Manual for Roads and Bridges (DMRB) – Environmental Assessment (Highways England – now known as National Highways (NH)); and
 - Planning Practice Guidance (PPG) documents ‘Environmental Impact Assessment’ and ‘Travel Plans, Transport Assessments and Statements in Decision-Taking’ first published by the Ministry for Housing, Communities and Local Government (MHCLG) in 2014 as a live online resource.
- 9.11.2 This chapter has been prepared in the context of a detailed assessment undertaken and reported on within the TA which is submitted in support of the LDO. While the TA has been used as source material, it predominately identifies the compliance of the Proposed Development with national and local transport policy and establishes that a safe and

acceptable access will be provided. The TA quantifies the transport and highways impact of the Proposed Development, but the environmental impact of the road traffic it will generate requires an assessment against different criteria; therefore, the assessment has been undertaken against the criteria set out in the “Guidelines for the Environmental Assessment of Road Traffic” referred to above.

- 9.11.3 The TA, prepared alongside this chapter, has been prepared in accordance with a scope of work that has been discussed extensively and agreed in consultation with SDC, SCC and NH. The TA scoping process commenced in November 2020 and has continued through to the submission of the LDO. The scoping process has involved the preparation of a series of technical notes and reports, and the holding of regular LDO Transport Sub Group meetings (as a subsidiary group of the Gravity Delivery Group).
- 9.11.4 A review of further national and local policy documents relevant to transport has confirmed a requirement for the Proposed Development to be supported by a TA and FTP and for it to be supported by a transport strategy which seeks to: minimise the need to travel; prioritise access by walking, cycling, micro mobility and public transport; provide safe and suitable access for all users; and manage residual traffic impacts.
- 9.11.5 The assessment undertaken in this chapter considers the likely effects the Proposed Development would have on the environment within proximity of the Site at peak construction phase assumed in 2024, and in 2032 when the development approved by the LDO is likely to have been delivered. In doing so, the effects have been compared against a baseline scenario including part implementation of the extant 2017 Planning Consent (i.e., the Gravity Link Road, ecological enhancements and Site remediation completed).
- 9.11.6 The assessment considers that environmental effects relating to traffic and transport are likely where 18-hour AAWT flows are predicted to increase by more than 30% (or the number of HGVs will increase by more than 30% - Rule 1), or other specifically sensitive areas where traffic flows will increase by more than 10% as a result of the Proposed Development (Rule 2).
- 9.11.7 The main receptors of note identified within the adopted study area (on Link 5) included:
- Woolavington Village Primary School, Woolavington Road ('high' sensitivity)
 - Woolavington Branch Surgery, Woolavington Road ('medium' sensitivity)
- 9.11.8 A bespoke scenario testing spreadsheet based multi-modal travel generation, distribution and assignment tool was developed to enable multiple scenarios for Gravity to be evaluated at a high level in order to help define the most effective mitigate at source measures. A single Core Gravity Scenario' test reflecting the desirable outcome scenario (as is the objective with a Scenario Testing approach) has been used within this assessment to produce assigned traffic flows across the network for impact assessments.
- 9.11.9 The Core Gravity Scenario includes the planned sustainable transport strategy and mode share strategy built around a 3-shift working pattern in an advanced manufacturing facility (informed by the operation of similar UK sites). Since the LDO is a market facing flexible consent in terms of actual land uses implemented, the scenario reflects the land uses and operations as below:
- Gravity will provide up to 1,000,000 sqm of Advanced Manufacturing floorspace creating 6,098 jobs, 65,000 sqm of supporting employment uses and 35,000 sqm of supporting ancillary uses, creating another 1,402 jobs combined.
 - The Site will operate on a 24/7 basis for 365 days per annum. A three-shift system for the advanced manufacturing will operate between 06:00-14:00, 14:00-22:00 and 22:00-06:00. The supporting ancillary uses are expected to operate around a similar basis to the three-shift advanced manufacturing activity on site.

- 90% of advanced manufacturing type jobs are assumed to work the three-shift system, with the remaining 10% assumed to work 09:00-17:00 hours.
- The advanced manufacturing is assumed, based on a first principles assessment which is set out in the TA, to generate circa 445,000 units output per annum, and HGV movements have been estimated on this basis.
- 750 residential units with an assumed split of 10% 1 bed, 20% 2 bed, 50% 3 bed and 20% 4 bed.
- Allowances have been made for trip internalisation on the basis that the Smart Campus will encourage cross visitation (supply chain) between land uses and therefore the Site will achieve a level of self-containment which in turn will minimise external trip making.

9.11.10 Scenario testing identified that a mode share of 65% car driver could be achieved in the 'Core Gravity' scenario by a range of different potential future transport outcomes. The scenario assumptions around a supporting transport strategy and transport mitigation measures are summarised below and include:

- a package of incentives to encourage cycling and enhanced infrastructure including the A38 corridor scheme and A39 route to Bridgwater Station.
- incentives for employees / residents to use public transport / and or cost on the employee for parking on site.
- Enhanced main A38 corridor bus services and bespoke, dedicated, Demand Response Transit (DRT) minibus / e-bus services for employees geared to align with shift patterns, funded by the investment plan and overseen or commissioned by the transport authority or occupier.
- Incentivised car share system.
- Associated trip internalisation factors.
- Comprehensive package of transport planning measures and monitoring (as set out in more detail in the FTP) to achieve the core target modal share of 65% car driver.

9.11.11 It is predicted that peak construction traffic flows will be lower than the fully operational development flows. The construction effects will be limited in time to the construction period and the majority of HGV movements limited to the Gravity Link Road, the A39 Puriton Hill, M5 Junction 23 and mainline; all links with no sensitive receptors present. The construction effects will also be managed through embedded mitigation proposals and specifically the Framework DCEMP submitted with this ES at [Appendix 4.1](#).

9.11.12 In terms of the operational phase of Gravity, it is predicted that after taking into consideration embedded mitigation for the scheme, the operational effects of the Proposed Development are not likely to be significant, and therefore no further environmental assessment has been undertaken in accordance with the IEMA 'Guidelines for the Environmental Assessment of Road Traffic' (Guidance Note No. 1) document and Volume 11 of the DMRB.

9.11.13 No further mitigation is expected to be required over and above the embedded mitigation described within this Chapter. Therefore, the residual effects will be the same as the assessed effects on the basis that no further mitigation is required over and above the embedded mitigation.

9.11.14 The operational transport effects of the proposals will continue to be actively monitored and managed through the implementation of a site wide FTP and Monitor and Manage Plan and in accordance with the wider approach described within the Embedded Mitigation section earlier in this Chapter.

9.12 Referencing

9.12.1 A list of references to material used in this chapter is provided below.

- IEMA, 1993, Guidelines for the Environmental Assessment of Road Traffic (Guidance Note Number 1). Institute of Environmental Assessment (now the Institute of Environmental Management and Assessment (IEMA)).
- Highways England, Volume 11 of the Design Manual for Roads and Bridges (DMRB) – Environmental Assessment (Highways England).
- MHCLG, 2014, Planning Practice Guidance (PPG) 'Environmental Impact Assessment' and 'Travel Plans, Transport Assessments and Statements in Decision-Taking'. Ministry for Housing, Communities and Local Government.
- MHCLG, 2021, National Planning Policy Framework (NPPF). Ministry for Housing, Communities and Local Government.



Gravity

Smart Campus

Gravity LDO Environmental Statement

**Volume 1 – Chapters 10:
Noise and Vibration**

10 Noise and Vibration

10.1 Introduction

- 10.1.1 This chapter reports the findings of the assessment of the likely significant effects of noise and vibration as a result of the Proposed Development at Gravity (hereafter referred to as the 'Proposed Development').
- 10.1.2 The purpose of this assessment is to identify the likely impact of the Proposed Development on the local noise and vibration climate during the construction and operational phases and determine the suitability of the Site for the Proposed Development.
- 10.1.3 This assessment and ES chapter has been produced by Stantec who are sponsoring members of the Institute of Acoustics (IOA), and registered members of the Acoustic Noise Consultants (ANC). In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.
- 10.1.4 Appendices submitted with the chapter are:
- Appendix 10.1 – Glossary of Acoustic Terminology
 - Appendix 10.2 - Figures
 - Appendix 10.3 - Instrumentation
 - Appendix 10.4 – Traffic Data
 - Appendix 10.5 – Time History Graphs
 - Appendix 10.6 – Operational Sound Levels

10.2 Policy, Legislation, Guidance and Standards

National Legislation

Control of Pollution Act (1974)

- 10.2.1 The Control of Pollution Act (CoPA) 1974 covers a wide range of environmental pollution including noise. Parts of the Act have been superseded by the Environmental Protection Act 1990.
- 10.2.2 Section 60 of the Act relates to the 'Control of Noise on Construction Sites' and Section 61 relates to obtaining 'Prior Consent for Work on Construction Sites'. These parts of the Act are often used in conjunction with other standards to determine acceptable noise levels in relation to construction, hours of operation and specific working methods or mitigation.
- 10.2.3 A Section 61 application outlines the proposed construction works, hours of operation and a mitigation plan to reduce noise and vibration impact through the use of Best Practicable Means. It allows prior consent to be agreed between the contractor and the council and assists with protecting the contractor from legal action being taken under Section 60 of CoPA or Section 80 of the Environmental Protection Act 1990.

Environmental Protection Act (1990)

10.2.4 The Environmental Protection Act (EPA) 1990 requires local authorities to investigate noise complaints from premises (land and buildings) and vehicles, machinery, or equipment in the street. This includes noise arising from construction sites.

10.2.5 If the local authority is satisfied that noise from a development amounts to a statutory nuisance, i.e. where the noise is such that it may be deemed prejudicial to health, or that would unreasonably and substantially interfere with the use or enjoyment of a home or other premises; then the authority must serve an abatement notice on the person responsible or in certain cases the owner or occupier of the property. The notice may require that the noise or nuisance is completely stopped or limited to certain times of the day.

National Planning Policy

National Planning Policy Framework (2021)

10.2.6 The revised National Planning Policy Framework (NPPF) was published in July 2021. In respect of noise, paragraph 174 states that in relation to conserving and enhancing the natural environment:

“Planning policies and decisions should contribute to and enhance the natural and local environment by...

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... noise pollution...”

10.2.7 In relation to ground conditions and pollution, paragraph 185 states that:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the Site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life;*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...”*

10.2.8 In relation to the integration of new development with existing premises and community facilities, paragraph 187 states that:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

10.2.9 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the “significant adverse impacts”. In this respect, the NPPG requires that local planning

authorities' plan-making and decision taking should take account of the acoustic environment, and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.

10.2.10 In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during construction wherever applicable) is, or would be, above or below the significant observed adverse effect level..."

Noise Policy Statement for England (2010)

10.2.11 The Noise Policy Statement for England (NPSE) was published by DEFRA in March 2010 and clarifies the underlying principles and aims of existing policy documents that relate to noise. It also sets out the long-term vision of Government noise policy which is: *"to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*.

10.2.12 The NPSE states that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and its effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

10.2.13 Paragraphs 2.20 and 2.21 define 'significant adverse' and 'adverse' impacts as applied to noise as follows:

"There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur."

10.2.14 Paragraph 2.22 clarifies that:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

10.2.15 The three aims of the NPSE are defined as follows:

“Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

“Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.” (Note: Applies when the impact lies somewhere between the LOAEL and SOAEL and does not mean that adverse effects cannot occur)

“Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

- 10.2.16 It is necessary to define the LOAEL and SOAEL for the potential source of noise to relate the potential impact to the aims and requirements of the NPSE.

National Planning Practice Guide (2019)

- 10.2.17 The Government's Planning Practice Guidance (PPG) on noise provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.
- 10.2.18 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
- 10.2.19 The LOAEL is described in PPG (Paragraph: 005 Reference ID: 30-005-20190722) as the level above which *“noise starts to cause small changes in behaviour and/or attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).”*
- 10.2.20 PPG identifies the SOAEL (Paragraph: 005 Reference ID: 30-005-20190722) as the level above which *“noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.”*

Local Planning Policy

Sedgemoor District Council – Developers Noise Assessment Guide (2020)

- 10.2.21 Sedgemoor District Council (SDC) has created guidance for the assessment of noise to assist developers where noise may be a material planning consideration. The guidance applies to developments where noise may have the ability to affect existing and proposed receptors.
- 10.2.22 The guidance provides a table of SDC's accepted noise limits. **Table 10.1** details the acceptable noise limits.

Location	Daytime 07:00 – 23:00		Night-time 23:00 – 07:00
	Preferred	Upper Limit	
Living room	N/A	35 dB LAeq, 16hr	N/A
Dining Room/ Area	N/A	40 dB LAeq, 16hr	N/A
Bedroom	N/A	35 dB LAeq, 16hr	30 dB LAeq, 8 hr 45 dB LAFmax*
Private Amenity Areas and Gardens	50 dB LAeq, 16hr	55 dB LAeq, 16hr	N/A

*No more than 10 times per night

Table 10.1 Sedgemoor District Council Acceptable Noise Limits for Residential Development

Sedgemoor Local Plan 2011 – 2032 (February 2019)

10.2.23 SDC adopted their Local Plan on 20th February 2019. The Local Plan sets out the adopted policies for development and growth across the district.

10.2.24 Policy D13 – Sustainable Transport and Movement states:

“[...] Proposals will:

[...] Contribute to reducing adverse environmental issues, including air, light and noise pollution [...].”

Policy D14 – Managing the Transport Impacts of Development states:

“Development proposals that will have a significant transport impact should:

- *Be supported by an appropriate Transport Assessment, Air Quality Assessment, Noise and Vibration Assessment [...].”*

10.2.25 Policy D24 – Pollution Impacts of Development states:

“Development proposals that are likely to result in levels of air, noise, light or water pollution (including groundwater), vibration or soil contamination that would be unacceptably harmful to other land uses, human health, or the built and natural environment will not be supported. Where there are reasonable grounds to suggest that a development proposal may result in a significant adverse environmental impact, taking into account the sensitivity of the location, the Council will require planning applications to be supported by assessments relating to [...] Noise pollution and/or vibration [...].”

10.2.26 Policy D25 – Protecting Residential Amenity states:

“Development proposal that would result in the loss of land of recreational and/or amenity value, or unacceptably impact upon the residential amenity of occupants of nearby dwellings and any potential future occupants of nearby or proposed dwellings, will not be supported. Particular consideration will be given to (but not limited to) the extent that the proposal could result in unacceptable impact relating to:

[...] noise or disturbance; [...].”

Bridgwater Vision (December 2015)

- 10.2.27 The Bridgwater Vision document provides a framework for the continued planned growth of Bridgwater.
- 10.2.28 A key objective for the Strategic Framework is to help to create a safe and attractive public realm for all with an enhanced environment for pedestrians and cyclists.
- 10.2.29 One of the objectives of the access and movement strategy is to reduce the transport related impacts on air and noise quality.

Puriton Energy Park Supplementary Planning Document (March 2012)

- 10.2.30 This Supplementary Planning Document was prepared by the council to guide and inform development of the brownfield site of the former Royal Ordnance Factory to support the allocation in the Core Strategy of the former ROF site as an Energy Park, with priority for renewable and low carbon energy generation and other energy related or complimentary uses. The SPD elaborates on policies in the Council's Core Strategy and is closely aligned to current corporate policy.

Other Relevant Policy, Standards and Guidance

British Standard 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

- 10.2.31 BS 8233, in relation to this development, sets out desirable guideline values in habitable rooms, such as living rooms and bedrooms.
- 10.2.32 The guideline values relate to steady external noise without a specific character, previously termed 'anonymous noise'. According to the standard, noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate. Examples of noise with a character may include tonal/intermittent plant noise emissions, music playback, and workshop noise. Examples of external steady noise sources may include environmental noise sources such as busy road traffic.
- 10.2.33 The desirable internal ambient noise levels for dwellings are presented in **Table 10.2**.

Activity	Location	Desirable Internal Ambient Noise Level	
		07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$
*Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,f}$, depending on the character and number of events per night. Sporadic noise events could require separate values.			
*Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative source of ventilation that does not compromise the façade insulation or the resulting noise levels.			
*Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.			
*A selection of the available notes			

Table 10.2 BS 8233 Desirable Internal Ambient Noise Levels for Dwellings

10.2.34 The Standard also provides advice in relation to desirable levels for external noise. It states that:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”

10.2.35 With respect to industrial noise, Paragraph 6.5.2 states:

“Where industrial noise affects residential or mixed residential areas, the methods for rating the noise in BS 4142 should be applied. BS 4142 describes methods for determining, at the outside of a building:

- a) noise levels from factories, industrial premises or fixed installations, or sources of an industrial nature in commercial premises; and*
- b) background noise level.”*

British Standard 4142:2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

10.2.36 BS 4142:2014 +A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incidental.

10.2.37 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However, the determination of noise amounting to a nuisance is beyond the scope of the standard.

10.2.38 The standard should not be used to assess sound from the passage of vehicles on public roads and railway systems; recreational activities; music and other entertainment; shooting grounds; construction and demolition; domestic animals; people; public address systems for speech and other sources falling within the scopes of other standards or guidance. The standard cannot be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.

10.2.39 The procedure contained in BS 4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur. It is noted that a BS 4142 assessment is reliant on measuring relevant background sound levels.

10.2.40 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:

- Typically, the greater this difference, the greater the magnitude of the impact;

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

10.2.41 In order to consider the context, BS 4142 advises that the following factors should be considered:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:
 - Façade insulation treatment;
 - Ventilation and/or cooling that will reduce the need to have windows open to provide rapid or purge ventilation; and
 - Acoustic screening.

British Standard 7445:2003 'Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures'

10.2.42 BS 7445-1 describes methods and procedures for measuring noise from all sources which contribute to the total noise climate of the community's environment, individually and in combination. The results are expressed as equivalent continuous A-weighted sound pressure levels, $L_{Aeq, T}$.

10.2.43 BS 7445-1 states that sound level meters that are used for noise measurements should conform to the Type 1 (or Type 2 as a minimum) as described in BS EN 61672:2013 Electroacoustics. Sound level meters should be calibrated according to the instructions of the manufacturer and field calibration should be undertaken at least before and after each series of measurements.

British Standard 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1 Noise

10.2.44 British Standard 5228-1 does not provide limits for demolition and construction noise. The standard provides a 'best practice guide' for noise control and includes sound power level (L_w) data for individual plant as well as a calculation method for the prediction of noise from demolition and construction activities.

British Standard 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2 Vibration

10.2.45 BS 5228-2 provides advice on the human response to demolition and construction vibration. BS 5228-2 suggests that, for demolition and construction activities, it is considered

appropriate to provide guidance in terms of the peak particle velocity (PPV) as measured outside the building.

Professional Practice Guidance on Planning and Noise, 2017

10.2.46 The Professional Practice Guidance on Planning and Noise (ProPG) provides guidance on a recommended approach to the management of noise within the planning system in England.

10.2.47 The scope of ProPG is limited to new residential development that will be predominantly exposed to airborne noise from transport sources.

10.2.48 Noise sources other than airborne transport (i.e. industrial, commercial, entertainment, etc.) and ground-borne noise and vibration fall outside of the scope of ProPG.

10.2.49 ProPG details a two-stage approach to the consideration of noise issues including:

- Stage 1 – an initial noise risk assessment of the Proposed Development site; and
- Stage 2 – a systematic consideration of four key elements.

10.2.50 **Table 10.3** summarises the noise risk categories as defined in ProPG for Stage 1 of the assessment process.

Site Noise Risk Level	Indicative Noise Levels excluding Mitigation (dB L _{Aeq,T})		Pre-Planning Application Advice
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)	
High	> 70	> 60	Increased risk that development may be refused on noise grounds. The risk may be reduced by following a good acoustic design process
Medium	60 – 70	50 - 60	The Site is likely to be less suitable from a noise perspective and an application may be refused unless a good acoustic design process is followed
Low	50 – 60	40 – 50	The Site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed
Negligible	< 50	< 40*	The Site is likely to be acceptable from a noise perspective
* Site Noise Risk Level should not be considered negligible where there could be more than 10 noise events with L _{Amax,f} > 60 dB			

Table 10.3 Stage 1 ProPG Risk Categories

10.2.51 Stage 2 comprises 4 key elements which are undertaken in parallel:

- Element 1 – demonstrating a ‘Good Acoustic Design Process’;
- Element 2 – observing internal ‘Noise Level Guidelines’;
- Element 3 – undertaking an ‘External Amenity Area Noise Assessment’; and
- Element 4 – consideration of ‘Other Relevant Issues’.

10.2.52 Following a good acoustic design process involves considering acoustics at an early stage in the design process; avoid 'unreasonable' acoustic conditions and prevent 'unacceptable' acoustic conditions; and achieve an integrated, optimum solution without overdesign.

10.2.53 Demonstration of good acoustic design must include:

- Checking the feasibility of relocating or reducing noise levels from relevant sources;
- Consider options for planning the Site or building layout;
- Consider the orientation of proposed building(s);
- Select construction types and methods for meeting building performance requirements;
- Consider the effects of noise control measures on ventilation, fire regulation, health and safety, CDM, etc.;
- Assess the viability of alternative solutions; and
- Assess external amenity areas noise.

10.2.54 With respect to internal noise levels, ProPG recommends that noise levels set out in BS 8233 are used for residential development. However, an additional criterion is proposed by ProPG for night-time L_{Amax} levels as follows:

"[...] In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax, F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

10.2.55 With respect to external noise levels, ProPG again makes reference to the guideline levels detailed in BS 8233 stating that:

"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq, 16hr}$."

10.2.56 The final element indicates that the assessment should consider 'Other Relevant Issues' which may include:

- Compliance with relevant national and local policy;
- Magnitude and extent of compliance with ProPG;
- Likely occupants of the development;
- Acoustic design verses unintended adverse consequences;
- Acoustic design verse wider planning objectives.

Calculation of Road Traffic Noise 1988 (CRTN)

10.2.57 CRTN describes the procedures for traffic noise calculation and is suitable for environmental assessments of schemes where road traffic noise may have an impact. The 'Method for converting the UK road traffic noise index $L_{A10, 18hr}$ to the EU indices for road noise mapping'

(TRL, Casella Stanger, 2006) can be used to convert $L_{A10, 18 \text{ hr}}$ road traffic noise levels to $L_{Aeq, 16 \text{ hr}}$ daytime and $L_{Aeq, 8 \text{ hr}}$ night-time ambient noise levels.

DEFRA 'Method for Converting the UK Traffic Noise Index $L_{A10, 18 \text{ hr}}$ to EU Noise Indices for Noise Mapping'

10.2.58 The 'Method for Converting the UK Road Traffic Index $L_{A10, 18 \text{ hr}}$ to the EU Noise Indices For Road Noise Mapping' was published by Defra, TRL and Casella Stanger in 2006 and can be used to convert $L_{A10, 18 \text{ hr}}$ (06:00 – 00:00 hours) sound levels from vehicular movements on a road to daytime, evening and night-time sound levels ($L_{Aeq, T}$) from vehicular movements on a road.

Department of Transport 1995: Calculation of Railway Noise

10.2.59 The Calculation of Railway Noise (CRN) (Department for Transport, 1995) describes procedures for calculating noise from moving railway vehicles and other types of vehicles which run on rails. It includes consideration of a number of factors including vehicle class, speed, distance attenuation and barrier attenuation.

10.2.60 Noise levels are measured or predicted in terms of the $L_{Aeq, 18 \text{ h}}$ or $L_{Aeq, 6 \text{ h}}$.

World Health Organization, Environmental Noise Guidelines for the European Region, 2018, W.H.O.

10.2.61 The World Health Organization (WHO) Environmental Noise Guidelines for the European Region (2018) sets out guidance on suitable external noise levels from specific noise sources including road traffic railway, aircraft, wind turbine and leisure noise, based on evidence, to inform policy makers.

10.2.62 The guidelines refer to L_{den} and L_{night} dB values for road traffic, railway, aircraft and railway noise, which is a sound descriptor not commonly used to assess site suitability within the UK. More commonly utilised descriptors are the daytime average ($L_{Aeq, 16 \text{ h}}$) and night-time average ($L_{Aeq, 8 \text{ h}}$) noise levels.

10.2.63 With respect to indoor noise levels, the guideline document states that *"the GDG (Guideline Development Group) recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid."* As such, further reference is made to the WHO Guidelines for Community Noise (CNG), 1999.

World Health Organization, Guidelines for Community Noise, 1999, W.H.O.

10.2.64 The WHO 'Guidelines for Community Noise' details guidance on suitable internal and external sound levels in and around residential properties. The following internal sound levels are recommended by the WHO:

- 35 dB $L_{Aeq, 16 \text{ hours}}$ in living rooms during the daytime (07:00 to 23:00 hours); and
- 30 dB $L_{Aeq, 8 \text{ hours}}$ in bedrooms during the night-time (23:00 to 07:00 hours).

10.2.65 With respect to the night-time maximum noise levels, the WHO guidelines state:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night."

10.2.66 In addition to the above, the guidelines suggest that daytime sound levels of above 50 dB $L_{Aeq, 16 \text{ h}}$ are of 'moderate annoyance' in the community with daytime sound levels above 55 dB $L_{Aeq, 16 \text{ h}}$ of 'serious annoyance'.

10.2.67 The above levels are in-line with guidance detailed in BS8233:2014 and ProPG Planning and Noise.

Design Manual for Road and Bridges (2020) – Design Manual for Road and Bridges LA 111 Traffic Noise and Vibration

10.2.68 The Design Manual for Roads and Bridges (DMRB) is considered to be the regulatory standard for the design of a new road or improvements to an existing road. LA 111 provides guidance on the environmental assessment of noise and vibration emissions and includes likely significant effects from:

- Construction noise;
- Construction vibration; and
- Operational noise.

10.2.69 Paragraph 1.5 of the DMRB states:

“Operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects.”

Construction Noise

10.2.70 The calculation of construction noise levels should follow the methodology outlined in BS 5228-1:2009+A1:2014 and should include:

- Construction plant in use on the project;
- Construction compounds; and
- Traffic on haul roads not part of the public highway.

Construction Vibration

10.2.71 The calculation of construction vibration levels should follow the methodology outlined in BS 5228-2:2009+A1:2014 for all activities with the potential to adversely affect vibration sensitive receptors.

Operational Road Traffic Noise

10.2.72 DMRB states that an operational road traffic noise study area should be defined where the need for further assessment has been established and should include all noise sensitive receptors that are potentially affected by operational noise changes generated by the project, either on the route of the project or other roads not physically changed by the project. The document notes that a study area of 600 m from new road links or link physically changed or bypassed by the project is normally sufficient for most projects.

10.2.73 DMRB states that the operational noise baseline shall be determined from Do Minimum noise levels in each assessment year.

10.3 Consultation

10.3.1 Consultation with the Environmental Health Officer (EHO) at SDC was undertaken on 8 July 2021 to discuss and agree the survey and assessment methodologies.

10.3.2 Comments from the EHO have been included below, along with our responses.

Environmental Sound Survey

"I would suggest that a 24 hrs noise survey is sufficient. 7 days data, 24 hrs/day, would provide more detail as to the current background levels."

10.3.3 The environmental sound survey was conducted over a seven-day period with continuous noise monitoring.

Residential Use – Internal Noise Levels

"There is no mention of impact noise L_{Amax} Levels. These should be included."

10.3.4 An assessment of internal L_{max} s has been undertaken, as per the Guidelines for Community Noise, which repeats the WHO guidelines:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night."

Incident Noise Levels at Private Outdoor Amenity Areas

"Woolavington and Puriton are neither city centres, nor large urban areas. We would anticipate the background ambient level is pretty low typically with M5 traffic noise being dominant source? Please see our SDC EH Developers Guide, which details the external level we would be requiring, notably an upper limit of 55 dB $L_{Aeq, 16 hr}$."

10.3.5 The SDC EH Developers guide has been reviewed as part of our Policy, Legislation, Guidance, and Standards section and guidance has been applied where appropriate.

Construction Phase

"A Phased CEMP will be crucial; especially if the residential part of the development is occupied during/prior to the rest of the development, and to protect local residents."

10.3.6 A Framework Demolition and Construction Environmental Management Plan (FDCEMP – **Appendix 4.1**) has been proposed as part of the embedded mitigation of the Proposed Development. Operational Traffic

"We would suggest a 'worst case' operational traffic noise assessment would be prudent especially given the B2 / B8 uses – though these will be subject to development site layout."

10.3.7 Operational traffic movements on the local road network have been included within this assessment, along with an assessment in accordance with BS 4142, which looks at the potential impact of HGV movements on the Site.

Commercial Development

"It is challenging to assess the potential noise impact without specifics of what each commercial unit will contain. Though if class-use specific applications are submitted; there should be the opportunity to access impact at that stage."

10.3.8 Commercial development has been assessed at an outline stage in this ES. A detailed assessment of the proposed commercial units should be assessed at a later stage, when uses have been finalised.

10.4 Methodology

Study Area

- 10.4.1 For the purposes of this assessment, noise and vibration sensitive receptors are considered to be any existing occupied premises adjacent to or in the vicinity of the Site used as a dwelling, place of worship, educational establishment, hospital or similar institution, or any other property likely to be adversely affected by noise or vibration. Noise sensitive receptors proposed within the development area are also included within the study area.
- 10.4.2 For the benefit of this chapter, the study area considers an area bound by the M5 to the west, the Huntspill River to the north, the B3141 to the west and Woolavington Road to the south.
- 10.4.3 The study area also includes existing noise sensitive receptors along the links that could be significantly affected by changes in traffic flows as a result of traffic generated by the Proposed Development. The change in traffic flows has been assessed along all links provided by the traffic model.

Baseline Data Collection

Procedure

- 10.4.4 An unattended environmental sound survey was undertaken between approximately 14:45 hours on 15 July 2021 and approximately 10:15 hours on 23 July 2021 in order to determine the existing sound climate across the Site and the surrounding area.
- 10.4.5 The survey was undertaken over a seven-day period. Measurements were made over 15-minute periods of the L_{Aeq} , L_{A90} , and L_{AFMax} sound levels.
- 10.4.6 The sound level meters were located in environmental cases. The microphones were connected to the meters via an extension cable and fitted with the manufacturer's windshield.
- 10.4.7 The instrumentation used in the survey (including calibration information) is listed in **Appendix 10.2**.
- 10.4.8 Field calibrations were performed before and after the measurements with no significant fluctuations recorded (< 0.5 dB). Calibration certificates are available upon request.

Measurement Locations

- 10.4.9 Sound measurements were undertaken at seven positions on and around the Site. The measurement positions are detailed in **Appendix 10.2, Figure 10.1**, and described in **Table 10.4**. The microphones were located approximately 1.5 m above ground level in a free-field position at all locations.

Position	Description
LT 1	The microphone was located to the northwest of the Site, adjacent to the Great Western Railway Line. The meter was located approximately 10 m from the closest track edge.
LT 2	The microphone was located in the northwest corner of the Site, within the ROF fence boundary.
LT 3	The microphone was located to the southwest of the Site, in a field adjacent to Rookery Close. The microphone was located approximately 20 m north of Puriton Allotments and 240 m west of Gravity Access Road.
LT 4	The microphone was located within the Site boundary along West Approach Road. The microphone was located approximately 2 m from the road edge.
LT 5	The microphone was located within the Site boundary to the southeast. The microphone was located approximately 5 m from Woolavington Road.
LT 6	The microphone was located within the Site boundary to the southeast. The microphone was located approximately 180 m back from Woolavington Road, in line with existing receptors located along Whiteley Meadows.
LT 7	The microphone was located in the northeast corner of the Site, within the ROF fence boundary.

Table 10.4 Description of Survey Locations

Meteorological Conditions

10.4.10 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the meteorological conditions throughout the entire survey period. However, based on a review of publicly available weather forecasts and observations at the beginning and end of the survey period, the weather conditions are detailed in **Table 10.5**.

Date	Description				
	Temperature (°C)	Precipitation (mm)	Cloud Cover (%)	Wind Speed (m/s)	Wind Direction
15/07/2021	18	0	10	< 5	NW
16/07/2021	21	0	10	< 5	NE
17/07/2021	23	0	0	< 5	NE
18/07/2021	24	0	0	< 5	NE
19/07/2021	24	0	0	< 5	N
20/07/2021	24	0	0	< 5	W
21/07/2021	23	0	0	< 5	NE
22/07/2021	23	0	50	< 5	E
23/07/2021	21	0	80	< 5	E

Table 10.5 Meteorological Conditions

10.4.11 These conditions are therefore considered suitable for obtaining representative sound level measurements.

Baseline Year

10.4.12 The year 2032 has been identified as the assessment year for operational effects to be included in the ES. This year has been identified as it is the end of the current Local Plan

period and a date by which it is reasonable to assume that the development approved by the LDO will have been delivered.

- 10.4.13 The sound data collected has been used, along with the baseline traffic data provided, to verify the acoustic model. A future baseline scenario has then been modelled using traffic data provided for a 2032 future without development scenario. This is considered an appropriate method of taking account of the changes in sound levels between the survey and the assessment year.

Sensitive Receptors

- 10.4.14 Based on a review of the baseline conditions, **Table 10.6** presents the receptors with the potential to be significantly affected by the Proposed Development. This considers the location of the receptor and its relationship with the Site. **Figure 10.2, Appendix 10.2** also details the approximate locations of the identified receptors.

Reference	Receptor
A	Farm building approximately 900 m north of Site along Withy Grove
B	Farm building approximately 550 m northeast of Site along B3141
C	Residential receptors at western edge of Woolavington village, approximately 30 m southeast of Site
D	Residential receptors along Woolavington road, approximately 40 m south of Site
E	Residential receptors at eastern edge of Puriton, approximately 120 m southwest of Site
F	Residential receptors at eastern edge of Puriton, approximately 380 m southwest of Site
G	Proposed residential receptors, on the south eastern part of Site

Table 10.6 Noise Sensitive Receptors

- 10.4.15 The Proposed Development also includes temporary housing for construction personnel. As it is not yet known where these will be located, a reference has not been given to these temporary receptors. However, they have been included in the relevant assessments.

Assessment of Significance

Significance of Impacts

- 10.4.16 This section summarises the approach adopted to apply noise and vibration related legislation, planning policy and industry standard guidance to the EIA process.

Potential Impacts in Terms of Noise and Vibration

- 10.4.17 The PPG provides advice regarding how to determine the impact of noise, including whether a significant adverse effect or adverse effect is occurring or likely to occur and whether a good standard of amenity can be achieved.
- 10.4.18 It provides more descriptive detail for the definitions of NOEL, LOAEL, and SOAEL but refrains from using numerical values. **Table 10.6** summarises the noise exposure hierarchy, based on the likely average response of those affected by potential noise and vibration impacts.

Response	Examples of Outcomes	Impact in Noise and Vibration Terms	Action
Very Noticeable Improvement	Causes a material change in behaviours and/or attitude e.g. individuals engage in activities which may have been avoided in the past. Quality of life enhanced due to change in character of the area.	Major	N/A
Noticeable Improvement	Improved noise climate results in small changes in behaviour and/or attitude e.g. turning down the volume of television, speaking more quietly, opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	Moderate	N/A
Just Noticeable Improvement	Noise impact can be heard but does not result in any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	Minor	N/A
No Observed Effect Level (NOEL)			
Not present	No Effect	Negligible	No specific measures required.
No Observed Adverse Effect Level (NOAEL)			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	Minor	No specific measures required.
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude, or other physiological response, e.g., turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Moderate	Mitigate and reduce to a minimum.
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g., avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Major	Avoid
Very disruptive and harmful	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory.	Substantial	Prevent

Table 10.6 Noise Exposure Hierarchy and Effect Levels

10.4.19 The impact in noise and vibration terms has been assessed with consideration to the proposed LOAELs and SOAELs based on the guidance set out in PPG and other relevant policy and standards.

Likely Significant Effects in EIA Terms

- 10.4.20 **Chapter 5** sets out the general methodology for the assessing the impact in terms of EIA significance.
- 10.4.21 The approach to assessing and assigning significance to an environmental effect relied upon the context of the results of the assessment undertaken in noise and vibration terms.
- 10.4.22 Effects that are described as ‘minor’ or ‘negligible’ in EIA terms are determined to be ‘not significant’, and effects that are described as ‘moderate’ or ‘major’ in EIA terms are determined to be ‘significant’ in the context of the EIA Regulations.
- 10.4.23 The level of effects and significance in EIA terms has been determined based on the results of the assessments and is discussed further in the ‘Assessment Approach’ section discussed below.

Scope

- 10.4.24 The assessment of the Proposed Development utilises a wide range of applicable standards and guidance. However, the principal guidance documents used to inform the assessment are as detailed in **Table 10.7**.

Assessment Type	Reference Document
Instrumentation and Measurement Procedures	BS 7445: Part 1:2003 Description and Measurement of Environmental Noise. Guide to Quantities and Procedures
Construction Noise and Vibration Impact	Design Manual for Roads and Bridges BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites
Construction Impact from Road Traffic	Design Manual for Roads and Bridges Department of Transport 1988: Calculation of Road Traffic Noise
Operational Impact from Road Traffic	Design Manual for Roads and Bridges Department of Transport 1988: Calculation of Road Traffic Noise
Assessment of Industrial Uses	British Standard 4142:2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound
Suitability of Site for Residential Use	British Standard 8233: 2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ Professional Practice Guidance on Planning and Noise, 2017

Table 10.7 Assessment Methodologies

Data Sources

Acoustic Model

- 10.4.25 An acoustic model has been prepared using SoundPLAN v8.2 to assess noise levels across the study area. The model includes the effect of topography and existing buildings.
- 10.4.26 SoundPLAN v8.2 uses the CRTN methodology to model noise from road traffic and includes variables such as the volume and speed of traffic.
- 10.4.27 The acoustic model includes traffic data provided by the transport consultants and detailed in **Appendix 10.3**. The trip generation assessment and methodology are outlined in **Chapter 9: Transport and Access**.

10.4.28 The cumulative effects have been assessed based on the predicted future traffic data. The scenarios include vehicular movements associated with the occupation of committed developments in the vicinity of the Site.

10.4.29 The following scenarios have been modelled:

- 2032 Future Baseline; and
- 2032 With Development.

Assessment Approach

Demolition and Construction Noise

10.4.30 BS 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' does not provide specific limits for construction noise, but it does define methods of assessing the significance. The standard also provides information on demolition and construction noise and vibration reduction measures promoting a 'Best Practice Means' approach to control noise and vibration. A method for determining the sound levels associated with demolition and construction activities is also detailed and considers the numbers and types of equipment operating, their associated Sound Power Level (L_w), and the distance to receptors, along with the effects of any screening.

10.4.31 Based on the guidance detailed in table E.1 of BS 5228:2009+A1:2014, **Table 10.8** below defines the threshold of potential significant effects at dwellings.

Assessment Category and Threshold Value Period	Threshold Value in dB ($L_{Aeq, T}$)		
	Category A ^A	Category B ^B	Category C ^C
Night-time (23:00 – 07:00)	45	50	55
Evenings and Weekends ^D	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
<p>Note 1 – A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the Site exceeds the threshold level for the category appropriate to the ambient noise level.</p> <p>Note 2 – If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise levels is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increase by more than 3 dB due to site noise.</p> <p>Note 3 – Applied to residential receptors only.</p>			
<p>A) Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.</p> <p>B) Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.</p> <p>C) Category C: Threshold values to use when the ambient noise levels (when round to the nearest 5 dB) are higher that category A values.</p> <p>D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays</p>			

Table 10.8 Threshold of Potential Significant Effect at Dwellings

10.4.32 With reference to BS5228, normal demolition and construction hours are Monday to Friday between 07:00 to 19:00 and Saturday 08:00 to 13:00.

10.4.33 For assessment purposes it is assumed no demolition or construction work will take place on Sundays or Bank Holidays.

10.4.34 As this is a high-level assessment, the calculations have been based on normal construction hours. If occupiers identify a requirement to work outside of these hours, this will be controlled through the compliance process application. This will be based on the specific construction activities that are required for evening and/or night-time periods.

10.4.35 **Table 10.9** defines the construction noise adverse impact levels for residential buildings.

Magnitude of Impact in Noise Terms	Construction Sound Level $L_{Aeq,T}$ (dB) at Residential Receptor
Substantial**	Above or equal to the Threshold Level* + 10 dB
Major	Above or equal to the Threshold Level* + 5 dB and below the Threshold Level* + 10 dB
Moderate	Above or equal to the Threshold Level* and below the Threshold Level* + 5 dB
SOAEL	
Minor	Above or equal to the Ambient Sound Level and below the Threshold Level*
LOAEL	
Negligible	Below the Ambient Sound Level
*Threshold level determined as per BS 5228:1 Section E3.2 and Table E.1	

Table 10.9 Construction Noise Impact Levels for Residential Buildings

Demolition and Construction Vibration

10.4.36 The effects of human response to whole body vibration in buildings are defined in BS 6472-1: 2008 in terms of Vibration Dose Value (VDV). However, for human response to construction-related vibration, it is considered more appropriate to use the Peak Particle Velocity (PPV) measure, as suggested in BS 5228-2:2009+ A1:2014 Code of practice for noise and vibration control on construction and open sites (BSI, 2014). Part 2: Vibration.

10.4.37 The limit of human perception to vibration is between approximately 0.15 mm/s and 0.3 mm/s PPV. The sensitivity of the human body also varies according to different frequencies of vibration, with perception generally possible between 1 Hz to 80 Hz.

10.4.38 Based on the above guidance **Table 10.10** details the proposed assessment criteria.

Magnitude of Impact in Vibration Terms	Vibration Level PPV mm/s	Description of Effects
Major	> 10	Vibration is likely to be intolerable for any more than a very brief exposure.
Moderate	1 to 10	Increasing likelihood of complaint in residential environments but can be tolerated at the lower end of the scale if prior warning and explanation has been given to residents.
SOAEL		
Minor	0.3 to 1	Increasing likelihood of perceptible vibration in residential environments.
LOAEL		
Negligible	< 0.3	Vibration is unlikely to be perceptible in even the most sensitive situations for most vibration frequencies associated with construction.

Table 10.10 Construction Vibration Impact Levels

10.4.39 Table B.2 of BS 5228-2:2009+A1:2014 provides guidance on PPV vibration limits for transient excitation for different building types. **Table 10.10** outlines the transient vibration guide values for cosmetic damage to buildings. Consideration will be given to the guideline values detailed in **Table 10.11** in determining the significance of construction vibration.

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or Framed Structures. Industrial and heavy commercial buildings.	50 mm/s at 4 Hz and above	
Un-reinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
<p>Note 1 Values referred to are at the base of the building.</p> <p>Note 2 At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.</p>		

Table 10.11 Transient Vibration Guide Values for Cosmetic Damage

10.4.40 In addition to the above, section 3.19 of DMRB states that construction vibration shall constitute a significant effect in EIA terms where it is determined that a substantial, major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights.
- A total number of days exceeding 40 in any six consecutive months.

Construction Traffic

10.4.41 The assessment of noise due to construction traffic on the existing sound climate in surrounding areas is based on the change in sound levels at noise sensitive receptors due to

a change in the volumes of road traffic generated by the construction of the Proposed Development.

10.4.42 The change in noise level has been calculated by comparing the construction traffic flows with the baseline traffic flows.

10.4.43 Assessment for this ES Chapter uses short-term assessment criteria taken from DMRB to assess the temporary construction impact. **Table 10.12** details the proposed assessment criteria.

Magnitude of Impact in Noise Terms	Change in Noise Level $L_{A10,18h}$ (dB) at Noise Sensitive Receptor
Major	≥ 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	< 1.0

Table 10.12 Change in Noise Levels Due to Construction Traffic

10.4.44 Where the impact in noise terms is above negligible, the assessment of effects, and therefore determining whether an effect is significant or not has taken into account the following factors:

- Proximity of calculated change to the minor/moderate boundary;
- Consideration of the calculated change in the long term;
- Absolute noise level with reference to relevant criteria in BS 8233:2014;
- The context of the specific noise sensitive receptor; and
- Acoustic context of the area and likely perception of change by the receptor.

10.4.45 In addition to the above, section 3.19 of DMRB states that construction noise and construction traffic noise shall constitute a significant effect in EIA terms where it is determined that a substantial, major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights;
- A total number of days exceeding 40 in any 6 consecutive months.

Operational Internal and External Noise Levels for Proposed Residential Receptors

10.4.46 Internal and external noise levels for proposed receptors have been assessed in accordance with BS 8233. As SDC have specified their required noise levels for these receptors, this has been used in the assessment,

Level	Proposed LOAEL and SOAEL Levels for Transportation Noise Affecting New Residential Premises	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Internal Noise Levels		
LOAEL	35 dB LAeq, 16 hr	30 dB LAeq, 8 hr
		45 dB LAmax 10-15 times per night
SOAEL	50 dB LAeq, 16 hr	45 dB LAeq, 8 hr
		65 dB LAMax if more than 20 events
		80 dB LAMax if less than 20 events
External Amenity Areas (Free Field Levels)		
LOAEL	50 dB LAeq, 16 hr	-
SOAEL	65 dB LAeq, 16 hr	-

Table 10.13 Internal and External Noise Criteria for Habitable Rooms Due to Transportation Noise

10.4.47 It is assumed that outdoor incident noise levels in external areas used for amenity (i.e. gardens/balconies) are only of concern during the daytime hours, as people are unlikely to make frequent use of the outdoor amenity areas during night-time hours.

Operational Road Traffic Noise Affecting Existing Receptors

10.4.48 Operational road traffic noise impacts have been assessed in accordance with guidance outlined in DMRB LA 111, implementing the calculation methodology of the CRTN.

10.4.49 The prediction method takes into account factors such as the traffic flow, composition and speed, the alignment and distance of the road relative to the receiving property in order to calculate the dB LA10 18 hour noise level.

10.4.50 The prediction of road traffic noise has been undertaken using the commercially available, proprietary noise mapping software Soundplan V8.2, which uses the CRTN calculation methodology, and is therefore appropriate for use in the prediction of noise for this scheme.

10.4.51 DMRB LA 111 provides a classification for the magnitude of change in road traffic noise. **Table 10.14** below presents the magnitude of impact in noise terms to assess the full and permanent effects of the Proposed Development.

Magnitude of Impact in Noise Terms	Change in Noise Levels at Noise Sensitive Receptor (dB LA10,18h, or L _{night})
Major	≥ 10.0
Moderate	5.0 to 9.9
Minor	3.0 to 4.9
Negligible	< 3.0

Table 10.14 Magnitude of Change in Noise Terms

Building Services Plant and Operational Noise from the Employment Uses

10.4.52 Building services plant noise and operational noise impacts from the Employment Uses have been assessed in accordance with guidance outlined in BS 4142.

10.4.53 Based on BS 4142, the proposed LOAEL and SOAEL values are provided in **Table 10.15**.

Magnitude of Impact in Noise Terms	Rating Level ($L_{A,T,r}$ dB) at Noise Sensitive Residential Receptor
Major	Greater than or equal to 10 dB above the typical background sound level, depending on context.
SOAEL	
Moderate	5-9.9 dB above the typical background sound level, depending on context.
LOAEL	
Minor	0-4.9 dB above the typical background sound level, depending on context.
Negligible	Less than the typical background sound level, depending on context.

Table 10.15 Proposed LOAEL and SOAEL for Existing and Proposed Building Services Plant and Industrial/Commercial Sources

Limitations

Baseline Sound Survey

- 10.4.54 The engineer noticed nothing unusual in terms of the sound climate at the time of the survey and the conditions were considered to be representative of typical conditions at the survey positions. This report refers, within the limitations stated, to the environment of the Site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary. No warranty is given as to the possibility of changes in the environment of the Site and surrounding area at differing times.
- 10.4.55 All COVID-19 restrictions had been removed at the time of the survey and it is considered that the measured noise levels are representative of typical conditions.

Construction Noise Assessment

- 10.4.56 BS 5228:2009 Annex E (Informative) states that noise predictions should be undertaken to determine eligibility for noise insulation or temporary re-housing. However, the informative also states that these assessments should be undertaken when a contractor has been appointed and detailed method statements on the construction programme and plant to be used are available.
- 10.4.57 The details of the types of construction methods and plant likely to be used during the construction phases are yet to be finalised. Therefore, at this stage in the scheme's design, it is not possible to state precisely where plant will operate and for how long during the working day. However reasonable assumptions have been made to inform the assessment of construction noise presented in this assessment.

10.5 Baseline Conditions

Current State of the Environment

- 10.5.1 Sound levels across the Site are currently dominated by vehicular movements on the surrounding road network, which includes the M5.
- 10.5.2 Vehicular noise from train movements on the Bristol to Exeter railway line also contribute to the noise levels on the Site.
- 10.5.3 The results of the survey are presented in the time history graphs in **Appendix 10.4**. A summary of the survey results is detailed in **Table 10.16**.

Date	Period, T	Parameter	Sound Level at Measurement Position						
			LT1	LT2	LT3	LT4	LT5	LT6	LT7
Thursday 15 July	Daytime (15:00 – 23:00 hours)	L _{Aeq,T}	60	Not Recorded					
		L _{A90,1hour} **	43						
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	55						
		L _{Amax} *	67						
		L _{A90,15mins} **	42						
Friday 16 July	Daytime (07:00 – 23:00 hours)	L _{Aeq,T}	61	52	49	47	56	51	46
		L _{A90,1hour} **	41	49	46	41	38	41	40
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	55	47	47	39	43	35	39
		L _{Amax} *	64	61	55	61	67	50	55
		L _{A90,15mins} **	45	42	39	30	25	25	35
Saturday 17 July	Daytime (07:00 – 23:00 hours)	L _{Aeq,T}	60	47	46	44	57	53	44
		L _{A90,1hour} **	43	42	41	35	36	38	38
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	47	47	47	39	43	35	42
		L _{Amax} *	58	59	59	56	66	56	56
		L _{A90,15mins} **	42	43	40	33	27	28	39
Sunday 18 July	Daytime (07:00 – 23:00 hours)	L _{Aeq,T}	59	46	44	45	50	41	45
		L _{A90,1hour} **	42	40	37	33	32	37	38
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	55	51	49	41	44	39	42
		L _{Amax} *	58	59	58	58	68	53	53
		L _{A90,15mins} **	44	46	43	36	30	32	36
Monday 19 July	Daytime (07:00 – 23:00 hours)	L _{Aeq,T}	60	46	44	47	48	42	63
		L _{A90,1hour} **	42	41	39	34	33	37	40
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	57	49	48	47	42	41	44
		L _{Amax} *	83	59	59	58	64	52	52
		L _{A90,15mins} **	45	43	42	38	33	35	38
Tuesday 20 July	Daytime (07:00 – 23:00 hours)	L _{Aeq,T}	60	50	47	47	48	46	52
		L _{A90,1hour} **	39	47	44	38	36	40	42
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	56	49	46	40	40	37	43
		L _{Amax} *	79	60	58	57	66	55	54
		L _{A90,15mins} **	42	43	41	34	28	29	36
Wednesday 21 July	Daytime (07:00 – 23:00 hours)	L _{Aeq,T}	60	49	47	46	48	42	53
		L _{A90,1hour} **	40	45	44	35	34	37	41
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	58	48	47	43	47	36	42
		L _{Amax} *	86	59	59	60	66	56	58
		L _{A90,15mins} **	44	43	40	32	26	27	35
Thursday 22 July	Daytime (07:00 – 23:00 hours)	L _{Aeq,T}	60	63	46	50	53	43	47
		L _{A90,1hour} **	50	42	41	34	35	36	40
	Night-time (23:00 – 07:00 hours)	L _{Aeq,T}	57	44	44	41	42	38	37
		L _{Amax} *	83	56	56	59	65	56	53
		L _{A90,15mins} **	48	39	35	29	24	27	32

* Based on the 90th percentile measured L_{Amax} level.

** Calculated based on the statistical distribution of background sound levels during the measurement period in general accordance with guidance in BS 4142:2014

***07:00 – 23:00 hours at LT1, 12:00 – 23:00 hours at all other locations

Table 10.16 Summary of Measured Environmental Sound Survey Results

- 10.5.4 The sound survey was undertaken between 15 July 2021 and 23 July 2021 at LT1 and between 16 July 2021 and 23 July 2021 at all other locations.

2032 Baseline

- 10.5.5 The future baseline scenario has been modelled using traffic data provided for a 2032 future baseline scenario.
- 10.5.6 Approved developments (or those considered likely to have been approved and implemented by 2032) are factored into the 2032 baseline, and therefore the assessment of likely significant cumulative effects with these developments is inherent to the assessment and has not be reported separately.
- 10.5.7 The noise contours for the 2032 Baseline scenario are presented in **Figure 10.3, Appendix 10.2**.

10.6 Embedded Mitigation

Railway Infrastructure

- 10.6.1 The reinstated railway line and extension is positioned to the north west of the Development Site, away from proposed and existing noise sensitive receptors. This allows the proposed commercial and industrial structures to provide acoustic screening to existing and proposed residential receptors.

Proposed Noise Sensitive Receptors

- 10.6.2 Proposed noise sensitive receptors have been positioned in the south of the Proposed Development, in the vicinity of existing noise sensitive receptors. In the context of the Development Site as a whole, this area will be less affected by the railway and the M5 due to the distance from these existing environmental noise sources.

Plant Noise

- 10.6.3 The rating noise level of fixed plant and equipment noise should be controlled through careful design so that local specific target noise levels are achieved. This will require a further detailed noise assessment as more information becomes available on the likely commercial activities on the Site and their location.
- 10.6.4 Plant should be selected, located and attenuated consistent with the usual practice of Sedgemoor District Council with regards to plant noise. It is likely that a combination of the following environmental noise control techniques would be implemented via the design guide and compliance processes:
- Enclosing noise generating plant within the building envelope;
 - Selecting 'low noise' plant items;
 - Positioning air intake/discharge louvres away from noise sensitive receptors;
 - Orientating air intake/discharge louvres away from noise sensitive receptors;

- Attenuation of air intake/discharge louvres with duct mounted attenuators; and
- Sound insulating plant housings/enclosures.

10.6.5 The rating level of fixed plant and building services associated with the Proposed Development will be controlled, by incorporating appropriate mitigation measures, to ensure they do not exceed the background levels.

Framework Demolition and Construction Environment Management Plan

10.6.6 The embedded mitigation included as part of the noise and vibration assessment includes the Framework Demolition and Construction Environmental Management Plan (FDCEMP), which is secured through the Compliance Form.

10.6.7 The appointed contractor will submit Section 61 applications to SDC under the Control of Pollution Act 1974 for planned construction activities that may result in temporary disturbance at noise sensitive receptors

10.6.8 The following advice is based on the guidance provided in BS5228-1:2009+A1:2014 and will be applied as appropriate to minimise the noise breakout from the construction activities affecting noise sensitive receptors. They have been incorporated into the FDCEMP:

- Ensuring the use of quiet working methods, the most suitable plant and reasonable hours of working for noisy operations, where reasonably practicable;
- Locating noisy plant and equipment as far away from dwellings as reasonably possible, and where practical, carry out loading and unloading in these areas;
- Screening plant to reduce noise which cannot be reduced by increasing the distance between the source and the receiver (i.e. by installing noisy plant and equipment behind large site buildings);
- Shutting down any machines that work intermittently or throttling them back to a minimum;
- Orientating plant that is known to emit noise strongly in one direction so that the noise is directed away from houses, where possible;
- Closing acoustic covers to engines when they are in use or idling;
- Lowering materials slowly, whenever practicable, and not dropping them; and
- Use of temporary acoustic barriers, where appropriate, and other noise containment measures, such as screens, sheeting and acoustic hoardings at the construction site boundary to minimise noise breakout and reduce noise levels at the potentially affected receptors.

10.6.9 In addition to the above, all reasonable steps will be taken to keep the local community informed of proposed construction operations. Measures for community liaison will be dealt with by a Community Liaison Officer to co-ordinate the dissemination of information (for example, by means of a regular newsletter) and to programme those operations at time that would minimise the potential for disturbance.

10.6.10 The above range of environmental management controls represent measures that are regularly and successfully applied to large-scale construction projects in order to minimise noise and vibration effects on local communities. The application of similar control measures during the construction phases would likewise support that the works proceed with the minimum disturbance to local residents.

10.7 Assessment of Likely Effects

Demolition and Construction Effects

Demolition and Construction Noise

- 10.7.1 Construction noise could potentially increase the ambient noise levels at existing noise-sensitive receptors and proposed noise-sensitive receptors if inhabited during the construction works.
- 10.7.2 Precise details of the types of construction methods and plant are still to be determined; however, the assessment considers construction activities during the following principal stages.
- Site preparation works
 - Demolition, foundations and substructure works
 - Building erection and superstructure works
 - Road works
 - Landscaping works, internal building construction and fit-out.
- 10.7.3 Internal building construction, and the servicing and fitting out of new buildings is normally not a significant source of noise or vibration and is not considered further.
- 10.7.4 Construction works will take place for a period of 10 or more days in any 15 consecutive days.
- 10.7.5 A detailed construction methodology and sequence is yet to be determined. Requirement for further assessment of construction noise mitigation will be incorporated in the FDCEMP.
- 10.7.6 The assessment assumes that the construction activities are distributed across the Site in accordance with the parameter plans.
- 10.7.7 An assessment of construction noise at each receptor has been undertaken, based on typical plant noise level data contained within Annex C of BS 52881:2009+A1:2014.
- 10.7.8 For the purposes of the construction noise assessment, **Table 10.17** details the calculated ambient noise levels at the identified receptors and the associated threshold level determined in accordance BS5228:1 Section E3.2 and Table E.1. There is a possibility that the residential part of the Proposed Development will be built and occupied before the commercial and industrial part of the Proposed Development are completed. The future proposed residential receptors have therefore been included in the construction assessment.
- 10.7.9 Due to limitations in the acoustic model calculation of the ambient noise level, it is not possible to calculate the 10-hour L_{Aeq} for direct comparison with the threshold levels detailed in BS5228. The calculated 16-hour L_{Aeq} therefore forms the basis of the assessment. It is not expected that this would significantly affect the results of the assessment, as the presented $L_{Aeq,16h}$ are expected to be lower than the $L_{Aeq,10h}$.

Receptor	Noise Sensitive Receptor Description	Calculated Ambient Noise Level (dB LAeq, 16h)	Threshold Level (dB LAeq, 10h)
A	Farm building approximately 900 m north of Site along Withy Grove	58	65
B	Farm building approximately 550 m northeast of Site along B3141	49	65
C	Residential receptors at western edge of Woolavington village, approximately 30 m Southeast of Site	47	65
D	Residential receptors along Woolavington road, approximately 40 m South of Site	57	65
E	Residential receptors at eastern edge of Puriton, approximately 120 m Southwest of Site	52	65
F	Residential receptors at eastern edge of Puriton, approximately 380 m Southwest of Site	54	65
G	Proposed residential receptors on the southern part of the Site, along Woolavington Road	52	65

Table 10.17 Calculated Ambient Level and Associated Threshold Level at each Receptor

Existing Noise Sensitive Receptors

10.7.10 **Table 10.18** details the results of the assessment for typical construction activities, calculated as the dB LAeq,10h to the noise sensitive receptors.

Receptor	Calculated Construction Noise Level (dB LAeq,10h) during Construction Stage at Noise Sensitive Receptor				
	Site Preparation Works	Demolition, Foundations and Substructure Works	Building Erection and Superstructure Works	Road Works	Landscaping Works and Fit-Out
A	33	29	31	34	22
B	37	33	35	38	26
C	62	58	60	63	52
D	60	56	58	61	49
E	50	46	48	51	40
F	40	36	38	41	30

Table 10.18 Typical Construction Plant Noise Levels

10.7.11 **Table 10.19** details the likely impact in noise terms of each construction stage at the assessment receptors, with the embedded mitigation in place.

Receptor	Calculated Impact in Noise Terms at Noise Sensitive Receptor				
	Site Preparation Works	Demolition, Foundations and Substructure Works	Building Erection and Superstructure Works	Road Works	Landscaping Works and Fit-Out
A	Negligible	Negligible	Negligible	Negligible	Negligible
B	Negligible	Negligible	Negligible	Negligible	Negligible
C	Minor	Minor	Minor	Minor	Minor
D	Minor	Negligible	Minor	Minor	Negligible
E	Negligible	Negligible	Negligible	Negligible	Negligible
F	Negligible	Negligible	Negligible	Negligible	Negligible

Table 10.19 Assessment of Impact for Construction Activity Noise

10.7.12 Calculations indicate that, the impact is likely to be a negligible to a moderate temporary short-term adverse impact in noise terms depending on the construction stage and receptor location.

10.7.13 As construction is likely to continue for 10 or more days in any 15 consecutive days, the impact in EIA terms is considered to be moderate and significant at receptors C and D, when relevant activities are being undertaken in proximity, and minor and not significant at receptors A, B, E and F.

Proposed Noise Sensitive Receptors

10.7.14 The assessment considers the effect of the demolition and construction on proposed residential receptors.

10.7.15 **Table 10.20** details the results of the assessment for typical construction activities, calculated as the dB $L_{Aeq,10h}$ to the noise sensitive receptors.

Receptor	Calculated Construction Noise Level (dB $L_{Aeq,10h}$) during Construction Stage at Noise Sensitive Receptor				
	Site Preparation Works	Demolition, Foundations and Substructure Works	Building Erection and Superstructure Works	Road Works	Landscaping Works and Fit-Out
Proposed Residential (G)	52	48	50	53	41

Table 10.20 Typical Construction Plant Noise Levels

10.7.16 **Table 10.21** details the potential impact in noise terms of each construction stage at the assessment receptors, with the embedded mitigation in place.

Receptor	Calculated Impact in Noise Terms at Noise Sensitive Receptor				
	Site Preparation Works	Demolition, Foundations and Substructure Works	Building Erection and Superstructure Works	Road Works	Landscaping Works and Fit-Out
Proposed Residential (G)	Minor	Negligible	Negligible	Minor	Negligible

Table 10.21 Assessment of Impact for Construction Activity Noise

- 10.7.17 Calculations indicate that, the impact is likely to be a negligible to a minor temporary short-term adverse impact in noise terms depending on the construction stage at future proposed receptors.
- 10.7.18 The noise impact is negligible to minor and the impact in EIA terms is considered to be minor and not significant at receptor G.
- 10.7.19 The Proposed Development also includes temporary housing for construction personnel. As it is not yet known where these will be located, a worst-case scenario has been assumed. The lowest ambient level presented in **Table 10.17** has been assumed.
- 10.7.20 Based on the highest typical construction plant noise levels presented in **Tables 10.19 and 10.21**, the impact could be up to a minor temporary short-term adverse impact in noise terms depending on the construction stage.
- 10.7.21 The impact in EIA terms is likely to be minor and not significant.

Construction Traffic Noise

- 10.7.22 The construction traffic noise assessment considers the change in ambient noise levels at existing receptors as a result of changes in the 18-hour AAWT traffic flows between the potential future traffic flows with and without the construction traffic.
- 10.7.23 As this is a high-level assessment, the calculations have been based on normal construction hours. If occupiers identify a requirement to work outside of these hours, this will be controlled through the compliance process application.
- 10.7.24 **Table 10.22** below presents the predicted change in noise levels, between the '2032 with development and construction traffic' scenario and the '2032 Baseline' scenario, based on the traffic flow predictions for 2032 along the road links provided by the transport consultants. The baseline scenario includes the consented HEP construction traffic.

Road Link	Calculated Change in Noise Level	Impact in Noise Terms
Woolavington Road East between Entrance Rbt and Proposed Residential Access	<1 dB	Negligible
Woolavington Road East between Proposed Residential Access and Woolavington School	<1 dB	Negligible
Woolavington Road East between Woolavington School and B3141 Crossroads	<1 dB	Negligible
B3139 Causeway	<1 dB	Negligible

Road Link	Calculated Change in Noise Level	Impact in Noise Terms
B3141 Woolavington Hill	<1 dB	Negligible
Woolavington Road West, west of Entrance Rbt	<1 dB	Negligible
A39 East of Puriton Hill Link Road Rbt	<1 dB	Negligible
A39 between Puriton Hill Link Road Rbt and M5 Jct 23	<1 dB	Negligible
M5 Motorway mainline north of Jct 23	<1 dB	Negligible
M5 Motorway mainline south of Jct 23	<1 dB	Negligible
A38 between Jct 23 and Dunball Rbt	<1 dB	Negligible
A38 North of Dunball Rbt	<1 dB	Negligible

Table 10.22 Predicted Change in Noise Levels from Construction Traffic

10.7.25 Calculations indicate that the impact on the identified roads is likely to be negligible in both noise and EIA terms, which is not significant.

Construction Vibration

10.7.26 At this stage in the design, it is not confirmed if piling activity or other significant vibration generating activities will be required during the construction of the Proposed Development. It has been assumed that piling will be required for the construction of the proposed commercial and industrial uses. It has also been assumed that if piling is required in the vicinity of residential dwellings, auger piling will be used.

10.7.27 The closest existing vibration sensitive receptors are likely to be approximately 30 m away from the closest demolition and construction works occurring on Site. BS 5288-2 provides indicative levels of vibration associated with auger piling, which indicates a level of 0.2 mm/s peak particle velocity (PPV) at distance of 9 m. Based on this indicative level, vibration levels as a result of auger piling are therefore likely to be below the proposed LOAEL and have a negligible impact.

10.7.28 The impact in EIA terms is therefore considered to be minor and not significant.

Operational Effects

10.7.29 The acoustic model has been used to calculate the effect of the Proposed Development on sound levels at the identified receptors.

External Noise Levels – Proposed Receptors

10.7.30 **Figure 10.4, Appendix 10.2** presents the daytime $L_{Aeq, 16 \text{ hr}}$ noise level contours across the proposed residential area at a height of 1.5 m for the 2032 With Development scenario.

10.7.31 Impacts are likely to vary across residential area so will be between approximately 47 and 57 dB $L_{Aeq, 16 \text{ hr}}$. It is therefore likely that noise levels at the worst affected receptors across the Site will fall above the LOAEL but below the proposed SOAEL during the daytime, corresponding to an impact up to moderate in noise terms.

10.7.32 The acoustic modelling has been undertaken as an open site and it is expected that noise levels would reduce across the Site as new buildings would offer shielding from the sources of noise.

10.7.33 Without mitigation, the impact in EIA terms is likely to be moderate and significant.

Internal Noise Levels - Proposed Receptors

- 10.7.34 A noise strategy that seeks to deliver the optimum acoustic outcome for the Site, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants, is secured within the Compliance Form.
- 10.7.35 Appropriate acoustic specification of building facade elements will result in appropriate internal conditions being achieved in residential dwellings across the Site.

Change in Ambient Levels – Existing Receptors

- 10.7.36 The road traffic noise assessment considers the change in ambient noise levels at existing receptors as a result of changes in the 18-hour AAWT traffic flows between the potential future traffic flows with and without the Proposed Developments. The Without Development scenario includes the consented HEP construction traffic
- 10.7.37 **Figure 10.5, Appendix 10.2** presents the change in the $L_{10, 18 \text{ hr}}$ noise levels due to road traffic. The comparison is made between the 2032 Baseline and the 2032 With Development scenarios.
- 10.7.38 The impact along the link roads presented identified in **Table 10.2** is likely to be minor to negligible in noise terms.
- 10.7.39 The impact in EIA terms is therefore considered to be minor to negligible and not significant.

Rail Infrastructure Assessment

- 10.7.40 An assessment of sound from the proposed rail infrastructure has been undertaken to determine the likely noise impact on the existing and proposed noise sensitive residential receptors.

Calculation Parameters

- 10.7.41 The precise locations and details of building services, fixed plant and activities related to the proposed uses are unknown. However, based on discussions with the design team, the following noise generating activities have been included in the acoustic model:
- Gantry Crane - Movement
 - Gantry Crane – Broadband Alarm
 - Gantry Crane – Spreader Impact
 - Gantry Crane – Container Placement
 - Reach Stacker
 - Telehandler
 - HGV movements on site (including reversing alarms) (19 per hour each way, 38 in total)
 - Train movements on site
- 10.7.42 **Appendix 10.5** presents the operational source levels for the activities listed above. All noise generating activities have been assumed to be operational 24 hours per day.

Background Sound Levels

10.7.43 Background sound levels during the operational periods are derived from the environmental sound survey locations LT 2, 3, 4, 6 and 7 which are considered representative of the future development receptors.

10.7.44 Based on the results of the environmental sound surveys, typical background sound levels on the development site vary between 33 and 43 dB during the day. Typical background sound levels during the night-time period (23:00 – 07:00) vary between 29 and 39 dB.

Acoustic Feature Corrections

10.7.45 Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound levels and the background sound level. The calculated specific sound level should therefore be modified in accordance with the following guidance.

10.7.46 BS 4142 offers the following guidance on the subjective assessment of acoustic feature corrections.

“Tonality

For sound ranging from not tonal to predominantly tonal the Joint Nordic Method gives a correction of between 0 dB and + 6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to + 9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other Sound Characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment a penalty of 3 dB can be applied.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time... If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”

10.7.47 Based on a review of the source data, the calculated specific sound levels at the receptor, and a subjective assessment at the location of the existing dwellings, no acoustic feature correction has been applied as specific sources are not likely to be individually distinguishable at the receptor locations.

Assessment Results

10.7.48 The model was used to calculate the combined rating level at the proposed receptors based on the specific sound levels of each item of plant/operation relating to the proposed rail infrastructure. The calculations in SoundPLAN have been undertaken using the industry standard ISO 9613 2:1996.

10.7.49 **Tables 10.23** below present the results of the BS4142 assessment at each receptor during the night. This is considered a worst-case assessment.

Description	Summary of Numerical Assessment Results at Receptor Locations						
	A	B	C	D	E	F	G
Calculated Specific Level at Receptor (dB L _{Aeq,15mins})	25	26	4	7	20	20	7
Acoustic Feature Corrections	0	0	0	0	0	0	0
Calculated Rating Level at Receptor (dB L _{Ar,15mins})	25	26	4	7	20	20	7
Background Sound Level (dB L _{A90,T})	39	34	29	33	38	38	33
Difference between Rating Level and Background Sound Level (dB)	-14	-8	-25	-26	-18	-18	-26
Assessment of Impact	Indication of a low impact, depending on the context						

Table 10.23 BS4142 Assessment Summary

10.7.50 Calculations show that noise from the rail infrastructure is likely to have a low impact at all existing and proposed noise sensitive receptors during both the daytime and the night-time, depending on the context.

10.7.51 In considering the context of proposals, the effects of the proposed rail infrastructure on all existing and proposed noise sensitive receptor are likely to be negligible in noise terms.

10.7.52 This is therefore considered a negligible impact in EIA terms, which is not significant.

Plant Noise Assessment

10.7.53 The Proposed Development includes a number of non-residential uses. Some of these uses are generally associated to a greater degree with the potential to have a noise impact on nearby noise sensitive receptors.

10.7.54 The impact in EIA terms is likely to be negligible and not significant at all receptors.

10.8 Further Mitigation

Operation

Proposed Noise Sensitive Residential Receptors

10.8.1 A noise strategy that seeks to deliver the optimum acoustic outcome for the Site, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants, will be put in place at the next design stage.

10.8.2 Appropriate acoustic specification of building facade elements will result in appropriate internal conditions being achieved in residential dwellings across the Site.

10.8.3 Based on a review of external noise levels it is expected that appropriate internal noise levels can be achieved with the use of acoustic double glazing and acoustic trickle ventilation at properties directly adjacent to roads. Away from roads, it is expected that appropriate internal noise levels can be achieved with the use of standard double glazing and trickle ventilation.

- 10.8.4 Purge ventilation is required throughout all buildings to aid the removal of high concentrations of pollutants and water vapour. It is commonly provided simply by opening windows and doors. Internal noise levels will increase as a result of opening windows, however, due to the temporary and intermittent occurrence this is not expected to result in an unacceptable increase in internal noise levels.
- 10.8.5 The mitigation outlined above is indicative for the purposes of the LDO in order to identify feasible mitigation options but is not sufficient for the procurement of building elements. A detailed acoustic assessment should be undertaken as part of the design of the scheme to establish the acoustic performance requirements of the various building elements.
- 10.8.6 Mitigation measures are unlikely to be required for the majority of external private amenity areas. However, amenity areas close to the existing and proposed noise sources in the area are likely to require mitigation measures to be considered during the next design of the scheme including:
- Consideration of the layout of the buildings and the orientation to maximise acoustic screening of noise sensitive external areas from nearby noise sources.
 - Use of acoustic barriers to reduce noise levels in areas adjacent to the existing and proposed noise sources.

10.9 Residual Effects

Demolition and Construction Phase

Demolition and Construction Noise and Vibration

- 10.9.1 It is considered that, with mitigation in place as detailed in the FDCEMP, the residual effects of the construction noise and vibration are likely to be up to moderate temporary adverse when relevant activities are being undertaken in proximity to relevant receptors. However, further assessment of construction noise and vibration mitigation may be required as appropriate when detailed method statements and construction programme are available. Monitoring of noise and vibration is not proposed where the mitigation measures are implemented in accordance with the FDCEMP.

Construction Traffic Noise

- 10.9.2 The change in noise levels at existing noise sensitive receptors as a result of construction traffic is likely to be negligible at all noise sensitive receptors. The residual effects in EIA terms are likely to be beneath the level of perception, which is negligible and not significant.

Operational Phase

Residential Areas

- 10.9.3 By incorporating appropriate mitigation measures outline above, operational noise affecting proposed noise sensitive residential properties can be reduced to a minor impact by shielding external amenity areas from the noise sources. The residual effects in EIA terms are likely to be up to minor, which would be not significant.
- 10.9.4 The change in noise levels at noise sensitive receptors as a result of traffic generated by the Proposed Development is likely to be up to minor and not significant at the worst affected noise sensitive receptors.
- 10.9.5 With appropriate mitigation the overall impact on internal noise levels in the proposed dwellings is negligible and not significant.

Rail Infrastructure

- 10.9.6 The effects of the proposed rail infrastructure on all existing and proposed noise sensitive receptor are likely to be negligible in noise terms.
- 10.9.7 This is likely to be a negligible impact in EIA terms, which is not significant.

Proposed Non-Residential Uses

- 10.9.8 By incorporating appropriate mitigation measures, it is likely that the effects associated with the proposed non-residential uses would be negligible and are therefore not significant in EIA terms.

10.10 Monitoring

- 10.10.1 No significant adverse effects have been identified and therefore monitoring is not required.

10.11 Summary

Introduction

- 10.11.1 A noise and vibration assessment has been undertaken to determine the likely significant effects from, and upon, the Proposed Development.
- 10.11.2 Consultation was undertaken with the Sedgemoor District Council Environment Health Department to agree the assessment methodologies through the EIA scoping process.
- 10.11.3 An unattended environmental sound survey was undertaken between 15 July 2021 and 23 July 2021 in order to determine the existing sound climate across the Site and at locations considered representative of the nearest noise sensitive receptors.
- 10.11.4 An acoustic model based on up to date traffic data has been created to complement the baseline studies and to predict the likely road traffic noise impact arising from the operation of the Development. It forms the basis of the assessment.

Demolition and Construction

- 10.11.5 A qualitative assessment has been undertaken of the likely noise and vibration impacts associated with the demolition and construction phase of the Proposed Development. Noise thresholds for the construction activities have been proposed at the nearest existing receptors in accordance with British Standard 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites and Guidelines on Noise Control for Construction Sites.
- 10.11.6 It is considered that, with mitigation in place as detailed in the FDCEMP, the residual effects are likely to be up to minor adverse, which is not significant. However, further assessment of construction noise and vibration mitigation may be required as appropriate when detailed method statements and construction programme are available.
- 10.11.7 Construction traffic has been assessed by considering the change in ambient noise levels at existing receptors as a result of changes in traffic flows during the construction phase. The change in noise levels at existing noise sensitive receptors as a result of construction traffic is likely to be negligible at all noise sensitive receptors, which is not significant.

Operation

- 10.11.8 The potential noise impact on the residential areas of the Proposed Development has been assessed. Mitigation measures are unlikely to be required for the majority of external private amenity areas. However, private external amenity areas close to the existing and proposed noise sources in the area are likely to require mitigation measures to be considered during the next design of the scheme. This is likely to be a minor impact and not significant.
- 10.11.9 Based on the calculated external noise levels it is expected that appropriate internal noise levels can be achieved with the use of acoustic double glazing and acoustic trickle ventilation at properties directly adjacent to roads. Away from roads, it is expected that appropriate internal noise levels can be achieved with the use of standard double glazing and trickle ventilation, which is likely to be a minor impact and not significant.
- 10.11.10 With appropriate mitigation the overall impact on internal noise levels in the proposed dwellings is negligible and not significant.
- 10.11.11 The change in noise levels as a result of traffic generated by the Proposed Development has been assessed. The results of the assessment show that the changes in noise levels due to the changes in road traffic are likely to be negligible at all noise sensitive receptors, which is not significant.
- 10.11.12 The potential noise impact of the proposed rail infrastructure has been assessed. The results of the assessment show that the impact is likely to be negligible at all noise sensitive receptors, and no specific mitigation is proposed at this stage.
- 10.11.13 It is considered that, with embedded mitigation in place, the impact of plant noise would be negligible and not significant.

10.12 References

- 10.12.1 Acoustics and Noise Consultants et al (2017); ProPG: Planning and Noise. Ingenious Design.
- 10.12.2 British Standards Institution (2014); BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. London: BSI.
- 10.12.3 British Standards Institution (2003); BS 7445:2003 Description and Measurement of Environment Noise – Part 1: Guide to Quantities and Procedures. London: BSI.
- 10.12.4 British Standards Institution (2014); BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open Sites Part 1 Noise. London: BSI.
- 10.12.5 British Standards Institution (2014); BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open Sites Part 2 Vibration. London: BSI.
- 10.12.6 British Standards Institution (2008); BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings Part 1 Vibration sources other than blasting. London: BSI.
- 10.12.7 British Standards Institution (2014); BS 4142:2014 Methods for rating and assessing industrial and commercial sound. London: BSI.
- 10.12.8 Department of Transport Welsh Office (1988); Calculation of Road Traffic Noise. London: HMSO.
- 10.12.9 Department of the Environment (1974); Control of pollution act 1974: implementation of part III – noise. London: HMSO.

- 10.12.10 Department of the Environment (1990); Environmental Protection Act 1990. London: HMSO.
- 10.12.11 Department for Communities and Local Government (2012); National Planning Policy Framework. London: HMSO.
- 10.12.12 Department for Communities and Local Government (2016); National Planning Practice Guidance. <https://www.gov.uk/government/collections/planning-practice-guidance>
- 10.12.13 Department for Communities and Local Government (2012); National Planning Policy Framework. London: HMSO.
- 10.12.14 Department for Environment, Food and Rural Affairs (2010); Noise Policy Statement for England. London: HMSO.
- 10.12.15 Department of Transport Welsh Office (1988); Calculation of Road Traffic Noise. London: HMSO.
- 10.12.16 The Highway Agency (2020); Design Manual for Roads and Bridges LA111 Noise and Vibration. London: HMSO.
- 10.12.17 World Health Organization (2018); Environmental Noise Guidelines for the European Region. Denmark: WHO.

11.1 Introduction

- ## 11.2 Policy, Legislation, Guidance and Standards

Air Quality Regulations

- 11.2.1 The Air Quality (England) Regulations 2000 (AQR) defined National Air Quality Objectives (NAQOs, a combination of concentration-based thresholds, averaging periods and compliance dates) for a limited range of pollutants. This was carried out for the purpose of protecting human health and the environment by avoiding, reducing, or preventing harmful concentrations of air pollutants. Subsequent amendments were made to the AQR in 2001 and 2002 to incorporate 'limit values' and 'target values' for a wider range of pollutants as defined in European Union (EU) Directives.
- 11.2.2 These amendments were consolidated by the Air Quality Standards Regulations 2010¹ (AQSR) (with subsequent amendments most notably in 2016 and for the devolved administrations), which transposed the EU's Directive 2008/50/EC on ambient air quality and cleaner air for Europe into the UK. The 2010 Regulations now have the status of retained EU

¹ The Air Quality Standards Regulations 2010 (legislation.gov.uk)

law pursuant to the European Union (Withdrawal) Act 2018². The 2010 Regulations set out that the limit values apply everywhere within England with the exception of:

- Any locations situated within areas where members of the public do not have access and there is no fixed habitation
- In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply
- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.

11.2.3 The relevant AQOs for this assessment have been taken from Schedule 2 of AQSR 2010 as shown in **Table 11.1**.

Pollutant	Time Period	Objectives	Source
NO ₂	1-hour mean	200 µg/m ³ not to be exceeded more than 18 times a year	NAQO and EU limit value
	Annual mean	40 µg/m ³	NAQO and EU limit value
PM ₁₀	24-hour mean	50 µg/m ³ not to be exceeded more than 35 times a year	NAQO and EU limit value
	Annual mean	40 µg/m ³	NAQO and EU limit value
PM _{2.5}	Annual mean	25µg/m ³	Stage 1 limit value by 2015 - NAQO and EU limit value
	Annual mean	20µg/m ³	Stage 2 limit value by 2020 - EU Directive

Table 11.1 Relevant Air Quality Objectives / Limit Values

11.2.4 The NAQOs for NO₂ and PM₁₀ were to have been achieved by 2005 and 2004 respectively, but also continue to apply in all future years thereafter.

11.2.5 The 2019 Clean Air Strategy includes a commitment to set a “*new, ambitious, long-term target to reduce people’s exposure to PM_{2.5}*” which the proposed Environment Bill 2019-2021³ commits the Secretary of State to setting. For the purposes of this assessment, it is appropriate to apply the EU Directive Stage 2 limit value for PM_{2.5} and give consideration to future potential changes.

National Air Pollution Plan for NO₂ in the UK

11.2.6 The national Air Quality Plan for NO₂ (DEFRA, 2018) sets out how the Government plans to deliver reductions in NO₂ throughout the UK, with a focus on reducing concentrations to below the EU Limit Values throughout the UK within the 'shortest possible time'.

11.2.7 The plan requires all Local Authorities (LAs) in England which DEFRA identified as having exceedances of the Limit Values in their areas past 2020 to develop local plans to improve air quality and identify measures to deliver reduced emissions, with the aim of meeting the Limit Values within their area within “*the shortest time possible*”. Potential measures include

² Statutory Instrument. (2018) European Union (Withdrawal) Act 2018, No. 1313.

³ Yet to be enacted

changing road layouts, encouraging public and private ultra-low emission vehicle (ULEV) uptake, the use of retrofitting technologies and new fuels and encouraging public transport. In cases where these measures are not sufficient to bring about the required change within 'the shortest time possible' then LAs may consider implementing access restrictions on more polluting vehicles (e.g., Clean Air Zones (CAZs)). A CAZ is defined within the plan as being *"an area where targeted action is taken to improve air quality and resources are prioritised and coordinated in a way that delivers improved health benefits and supports economic growth"* and may be charging or non-charging.

The Air Quality Strategy

- 11.2.8 Part IV of the Environment Act 1995 (Environment Act, 1995) required the Secretary of State to prepare and publish a national air quality strategy (AQS) containing standards, objectives and measures for improving ambient air quality and to keep these policies under review.
- 11.2.9 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK (DEFRA, 2007). The primary objective of the Air Quality Strategy is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Air Quality Strategy sets out the NAQOs and Government policy on achieving these.
- 11.2.10 The Clean Air Strategy (2019) (CAS) aims to lower national emissions of pollutants, thereby reducing background pollution and minimising human exposure to harmful concentrations of pollution. The Strategy aims to create a stronger and more coherent framework for action to tackle air pollution (DEFRA, 2019a). The CAS does not set legally binding objectives, instead it has targets for reducing total UK emissions of nitrogen oxides (NO_x) and fine particulate matter (PM_{2.5}) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery or NRM).

Local Air Quality Management

- 11.2.11 Part IV of the Environment Act 1995 (Environment Act, 1995) introduced a system of Local Air Quality Management (LAQM) which requires local authorities to regularly and systematically review and assess air quality within their boundary and appraise development and transport plans against these assessments. The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002. In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values although compliance dates differ.
- 11.2.12 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the NAQOs within its AQMA.
- 11.2.13 The Local Air Quality Management Technical Guidance 2016 (LAQM.TG(16); DEFRA, 2018), issued by the Department for Environment, Food and Rural Affairs (DEFRA) for Local Authorities provides advice on where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year) as summarised in **Table 11.2**.

Averaging Period	NAQOs should apply at:	NAQOs don't apply at:
Annual mean	<p>All locations where members of the public might be regularly exposed</p> <p>For example: Building façades of residential properties, schools, hospitals, care homes etc</p>	<p>Façades of offices or other places of work where members of the public do not have regular access</p> <p>Hotels, unless people live there as their permanent residence</p> <p>Gardens of residences</p> <p>Kerbside sites</p> <p>Any other location where public exposure is expected to be short term</p>
24-hour mean and 8-hour mean	All locations where the annual mean NAQO would apply, together with hotels and gardens of residences	<p>Kerbside sites</p> <p>Any other location where public exposure is expected to be short term</p>
1-hour mean	<p>All locations where the annual mean and 24 and 8-hour mean NAQOs apply as well as: Kerbside sites</p> <p>Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more.</p> <p>Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.</p>	Kerbside locations where the public would not be expected to have regular access
15-minute mean	All locations where members of the public might reasonably be regularly exposed for a period of 15 minutes or longer.	

Table 11.2 Relevant Public Exposure

Statutory Nuisance

11.2.14 Section 79(1)(d) of the Environmental Protection Act 1990⁴ defines one type of 'statutory nuisance' as "any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance". Where a Local Authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. Best practicable means is a widely used defence by operators, if employed to prevent or to counteract the effects of the nuisance.

Protection of Habitats

11.2.15 As well as their potential to impact on human health, some air pollutants have long been acknowledged to have effects on vegetation and freshwater systems. Whilst direct impacts of air pollutants on fauna are less common, any such effect on the health of vegetation or freshwater systems can then affect animal species that are dependent on the vegetation.

⁴ Parliament of the United Kingdom (1990) Environmental Protection Act 1990

- 11.2.16 Biodiversity 2020 is the latest biodiversity strategy for the UK (DEFRA, 2020) and aims to “halt biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks...”. The Strategy recognises air pollution as a direct environmental pressure on biodiversity and planning and development as one of the sectors with the greatest potential for direct influence.
- 11.2.17 The Conservation of Habitats and Species Regulations 2017 (Statutory Instrument, 2017) (the Habitats Regulations), transposed the Habitats Directive (European Council Directive 92/43/EEC) in England and Wales. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Statutory Instrument, 2019) amends the 2017 Habitats Regulations to reflect the UK’s departure from the EU and came into force following the end of the Transition Period in December 2020.
- 11.2.18 The Habitats Regulations require the UK Government to introduce a range of measures for the protection of habitats and species. Special Areas of Conservation (SACs) are designated under these regulations, as are Special Protection Areas (SPAs). These sites form a network termed ‘Natura 2000’ and collectively these sites are known as European Sites, or the ‘national site network’.
- 11.2.19 Designated Wetlands of International Importance (known as Ramsar sites) do not form part of the national site network. Many Ramsar sites overlap with SACs and SPAs and may be designated for the same or different species and habitats. All Ramsar sites remain protected in the same way as SACs and SPAs.
- 11.2.20 The Habitats Regulations primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna.
- 11.2.21 In addition, the Habitats Regulations require the competent authority to evaluate whether a project or plan has the potential to give rise to a “likely significant effect” and where this is the case, an “appropriate assessment” is required to determine whether the development will adversely affect the integrity of the site.
- 11.2.22 Sites of national importance may be designated as Sites of Special Scientific Interest (SSSIs) and improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way (CROW) Act 2000. If a development is “likely to damage” a SSSI, the CROW act requires that a relevant conservation body (i.e. Natural England) is consulted. The CROW act also provides protection to local nature conservation sites, which can be particularly important in providing ‘stepping-stones’ or ‘buffers’ to SSSIs and other sites designated under the Habitat Regulations.

Critical Levels

- 11.2.23 Critical levels are a quantitative estimate of exposure to one or more airborne pollutants in gaseous form, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.
- 11.2.24 Critical levels for NO_x for the protection of vegetation and ecosystems have been set by the UK Government within the AQSR as summarised in **Table 11.3** and are the same as the EU limit values and Natural England applies the objective to all internationally designated conservation Sites and SSSIs.

Pollutant	Time Period	Objective
Oxides of nitrogen (expressed as NO ₂)	Annual mean	30 µg/m ³
	24-hour mean	75 µg/m ³
Ammonia (NH ₃)	Annual mean	3 µg/m ³ (unless lichens or bryophytes are present, then 1 µg/m ³)
Sulphur dioxide (SO ₂)	Annual mean and winter average	20 µg/m ³

Table 11.3 Vegetation and Ecosystem Objectives

Critical Loads

- 11.2.25 Critical loads for nitrogen deposition onto sensitive ecosystems have been identified by the United Nations Economic Commission for Europe (UNECE). They are defined as the amount of pollutant deposited to a given area over a year, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.
- 11.2.26 In relation to combustion emissions, critical loads for eutrophication and acidification are relevant which can occur via both wet and dry deposition; however, on a local scale only dry (direct deposition) is considered significant.
- 11.2.27 Empirical critical loads for eutrophication (derived from a range of experimental studies) are assigned based for different habitats, including grassland ecosystems, mire, bog and fen habitats, freshwaters, heathland ecosystems, coastal and marine habitats, and forest habitats and can be obtained from the UK Air Pollution Information System (APIS) website (APIS, 2020)
- 11.2.28 Critical loads for acidification have been set in the UK using an empirical approach for non-woodland habitats on a 1km grid square based upon the mineralogy and chemistry of the dominant soil series present in the grid square, and the simple mass balance (SMB) equation for both managed and unmanaged woodland habitats.

National Planning Policy

- 11.2.29 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how they should be applied (Ministry of Housing, Communities & Local Government, 2021). The following paragraphs are considered relevant from an air quality perspective.
- 11.2.30 Paragraph 104 on promoting sustainable transport states:
- “Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: ...*
- d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; ...”*
- 11.2.31 Paragraph 105 goes on to state:
- “Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health.”*
- 11.2.32 Paragraph 174 on conserving and enhancing the natural environment states:
- “Planning policies and decisions should contribute to and enhance the natural and local environment by: ...*

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land stability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans, and..."

11.2.33 Paragraph 185 within ground conditions and pollution states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

11.2.34 Paragraph 186 states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

11.2.35 Paragraph 187 states that:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed".

Local Planning Policy

Sedgemoor Local Plan 2011-2032

11.2.36 The Sedgemoor Local Plan (2011-2032) sets out the policy framework for future development in the district and was formally adopted in February 2019 (SDC, 2019). Policy D24 Pollution Impacts of the Development states:

"Development proposals that are likely to result in levels of air, noise, light or water pollution (including groundwater), vibration or soil contamination that would be unacceptably harmful to other land uses, human health, tranquillity, or the built and natural environment will not be supported. Where there are reasonable grounds to suggest that a development proposal may result in a significant adverse environmental impact, taking into account the sensitivity of the location, the Council will require planning applications to be supported by assessments relating to:

- Air pollution
- Noise pollution and/or vibration;
- Light pollution;

- Carbon Emissions;
- Contaminated Land/soil;
- Waste;
- Water pollution;
- Odour; and
- Any other sources.

Where it is demonstrated that it is possible to manage the potential adverse impacts of the development proposal through its design or mitigation measures, the Council will, by means of condition or legal agreement, seek to ensure such measures are effective, for example by imposing limitations on matters including hours of operation, emission of fumes, noise and light, parking and servicing for both construction and operational stages.

In order to protect and improve water quality, potentially contaminating development proposals on aquifers or within Source Protection Zones will need to demonstrate that groundwater and surface water is adequately protected from pollution to prevent a deterioration of water quality of the water source. Development proposals adjacent to a watercourse should incorporate measures to protect the watercourse consistent with the actions of the River Basin Management Plan. The incorporation of SuDS within development proposals that protect and improve water quality will be supported...

Puriton Energy Park SPD

- 11.2.37 SDC prepared this Supplementary Planning Document (SPD) to examine the potential of the brownfield site of the former Royal Ordnance Factory (ROF) located at Puriton (SDC, 2012). The SPD seeks to define, through development principles, the role, function, and character of the proposed Energy Park with the objective to achieve sustainable high-quality development. There is no specific policy that relates to air quality; however, the SPD states an air quality assessment is required to support the planning application. The SPD informed the subsequent Huntspill Energy Park application and the environmental assessment process which accompanied it. Since this time, design principles have been agreed for this application.

Bridgwater Vision

- 11.2.38 The Bridgwater Vision sets out the 50-year regeneration strategy for Bridgwater (SDC, 2015). It sets out a regeneration framework for the town, demonstrating how the town's environment will meet the highest 21st century aspirations of its people and businesses. The document sets out how Bridgwater is to become an exemplar for sustainable and contemporary development through further integration of energy generation, green infrastructure, air quality improvements, sustainable transport and flood prevention measures to ensure that Bridgwater is resilient and able to adapt to climate and economic change.

Guidance

Improving Air Quality in the UK: Tackling Nitrogen Dioxide in our Towns and Cities. UK Air Quality Plan for Tackling Nitrogen Dioxide, 2017

- 11.2.39 The UK Government was required by the High Court to release an Air Quality Plan to meet the NO₂ Limit Value in the shortest timescale as possible. This document was published on 26th July 2017. The plan focuses on reducing concentrations of NO_x and NO₂ around road vehicle emissions within the shortest possible time. The measures set out in the Plan provide measures relevant to national government and local authorities which are not relevant to the operation or design of the Development.

DEFRA 'Local Air Quality Management Technical Guidance (LAQM.TG(16))'

11.2.40 Defra LAQM.TG(16) was published for use by local authorities in their LAQM review and assessment work (Defra, 2021). The document provides key guidance on aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

EPUK / IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'

11.2.41 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have together published guidance to help ensure that air quality is properly accounted for in the development control process (EPUK / IAQM 2017). It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

IAQM 'Guidance on the Assessment of Dust from Demolition and Construction'

11.2.42 Guidance on the assessment of dust from demolition and construction has been published by the IAQM (IAQM, 2014). The guidance provides a series of matrices to determine the risk magnitude of potential dust sources associated with construction activities in order to identify appropriate mitigation measures that are defined within further IAQM guidance.

IAQM 'Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites'

11.2.43 The IAQM has published guidance on the assessment of air quality impacts on designated nature conservation sites (IAQM, 2019) which adopts a similar procedure to that detailed in Natural England guidance on the assessment of road traffic emissions (Natural England, 2018) and identifies that exhaust pipe emission of ammonia is an additional relevant pollutant when assessing nitrogen deposition to sensitive ecological features.

11.3 Consultation

11.3.1 The EIA Scoping Report was submitted to SDC in June 2021, a Scoping Opinion was received in September 2021, and SDC confirmed that they were satisfied that appropriate human health receptors and effects have been identified within the scope of the air quality ES topic and that air quality should be scoped in to the ES.

11.4 Methodology

Study Area

11.4.1 The study area adopted for the demolition and construction assessment is as follows:

- for the construction dust risk assessment, the study area (based on IAQM, 2014 guidance) is defined as comprising the area up to 350m from the Site boundary and 50m from the route used by construction vehicles (up to 500m from the Site entrance(s));
- for the construction phase road traffic emission assessment, the study area (based on the EPUK / IAQM, 2017 guidance) includes all roads (and adjacent properties) predicted to exceed the screening criteria outlined in **Table A11.3.1, Appendix 11.2**.

11.4.2 The study area adopted for the operational phase assessment is as follows:

- for the operational phase road traffic emissions assessment, the study area (based on EPUK / IAQM, 2017 guidance) includes the Site, all roads (and adjacent properties) within 250m of the Site boundary and any roads predicted to exceed the criteria.

11.4.3 For the assessment of the potential indirect impact of stack emissions on ecological receptors the screening criteria outlined by the EA guidance (EA, 2016) has been used. This guidance requires that designated ecological sites should be assessed if they are located within the following distances from the emission source:

- Special Protection Areas (SPAs), Special Area of Conservation (SACs) or Ramsar sites within 10 km; and / or
- Site of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and local nature sites (ancient woodland, Local Wildlife Sites (LWSs) and Local Nature Reserves (LNRs)) within 2 km.

Construction Dust Impacts

11.4.4 Guidance from the IAQM recommends splitting construction activities into four separate source categories and determining the dust risk associated with each of these individually. This assessment has determined the risk of each of the following source categories:

- Demolition
- Earthworks
- Construction
- Trackout (the transport of dust and dirt onto the public road network).

11.4.5 During demolition, earthworks and construction, dust from on-site activities and off-site track out by construction vehicles has the potential to impact on sensitive human receptors within the study area; the main potential impacts are loss of amenity (as a result of dust soiling) and deterioration of human health (as a result of concentrations of PM₁₀). Activities also risk causing annoyance due to dust soiling and harm to ecological receptors.

11.4.6 The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source(s).

11.4.7 Separation distance is also an important factor. Large dust particles (greater than 30µm), can be potentially responsible for most dust annoyance, will largely deposit within 100 m of sources. Intermediate particles (10-30 µm) can travel 200-500 m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10 µm), which are the predominant fraction that can be potentially responsible for human health impacts largely remain airborne. However, the impact on the short-term concentrations of PM₁₀ occurs over a shorter distance due to the rapid decrease in concentrations with distance from the source due to dispersion.

11.4.8 The risk of each source for dust effects is described as 'negligible', 'low risk', 'medium risk' or 'high risk' depending on the nature and scale of the construction activities and the proximity of sensitive receptors to the construction activities or site boundary. The assessment is used to identify appropriate mitigation measures proportional to the level of risk, to reduce the effects such that they are not significant.

Screening Assessment

11.4.9 The first stage of the assessment involves screening to determine if there are sensitive receptors within threshold distances of the activities associated with the construction phase of the scheme; defined as the study area. No further assessment is required if there are no receptors within the study area.

11.4.10 The IAQM guidance outlines that an assessment is only required in cases where:

- A 'human receptor' is located within:
 - 350 m of the boundary of the Site; OR
 - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).
- An 'ecological receptor' is located within:
 - 50 m of the boundary of the Site; OR
 - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

Further Assessment

11.4.11 The dust risk category defined for each dust source and effect is then used to determine appropriate site-specific mitigation measures to be adopted. It should be noted that in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation.

11.4.12 Although the construction is likely to be undertaken in phases, as is typical with large schemes, this Construction dust impact assessment assumes that each activity (earthworks, construction and track out) may occur concurrently. This is a conservative assumption and will result in a higher level of identified pre-mitigated risk. It is also possible for material import to assist with ground preparation to be in advance through the remediation consent and the associated material management plans and construction traffic management plans.

11.4.13 The risk of impacts associated with dust soiling and PM₁₀ caused by the Proposed Scheme has been determined (following the IAQM guidance) based on the dust emission class (or magnitude) for each activity arising from four activities in the absence of mitigation (demolition, earthworks, construction and track out) as shown in **Table A11.2.1**.

11.4.14 The sensitivity of receptors is then defined (as 'high', 'medium' or 'low') for each dust effect (dust soiling, human health, and ecosystem impacts) in accordance with the criteria presented in **Table A11.2.2** 'Receptor Sensitivity'.

11.4.15 The overall sensitivity of the surrounding area is determined for each activity using the matrices in **Appendix 11.2** based on the IAQM dust guidance approach in combination with indicative thresholds and professional judgement. The sensitivity of the area is based on the distance of the source from the closest receptors, the receptor sensitivity, and in the case of PM₁₀ effects, the local background concentration. **Table A11.2.3** determines the sensitivity of an area to dust soiling effects. **Table A11.2.4** determines the sensitivity of an area to human health impacts and **Table A11.2.5** determines the sensitivity of an area to ecological impacts.

11.4.16 The risk of dust impacts arising is a product of the relationship between the dust emission magnitude and the area sensitivity and is based on the criteria outlined in **Table A11.2.6** based on the IAQM guidance. The risk of impact is then used to determine the mitigation requirements.

11.4.17 Results of the dust assessment are presented in [give section reference when known]

Construction Road Traffic Emissions

11.4.18 The potential for a significant overall effect on existing sensitive receptors within the Study Area because of emissions from demolition and construction traffic generated by the Proposed Scheme has been determined quantitatively, taking into consideration the screening criteria outlined in the EPUK / IAQM guidance (EPUK / IAQM, 2017) (see **Appendix 11.2**), the anticipated routing of the generated traffic and the anticipated duration of impacts associated with the generated traffic. If it is not possible to screen out the potential for significant impacts, then a detailed assessment will be undertaken.

Completed Development Traffic Emissions

Screening Assessment

Impacts of Development-Generated Traffic on Existing Sensitive Human Receptors

11.4.19 The potential for significant impacts on existing sensitive receptors within the study area as a result of emissions from traffic generated by the Proposed Development is determined based on the screening criteria outlined in the EPUK / IAQM guidance (see **Appendix 11.2** which includes consideration of the volume and composition of traffic generated by the Proposed Development and existing local air quality conditions (i.e. the presence of any declared AQMAs).

11.4.20 If it is not possible to screen out the potential for significant impacts, then a detailed assessment will be undertaken (see Paragraphs 11.4.20 to 11.4.25).

Site Suitability

11.4.21 A qualitative assessment to determine whether there is a potential for exceedances of the relevant NAQOs at residential locations within the Proposed Development has been undertaken, considering future baseline air quality conditions within and close to the Site, and the proximity of sensitive locations within the development to nearby sources of emissions.

Ecological Receptors

11.4.22 In relation to ecological receptors, a detailed (quantitative) air quality assessment of impacts is required if there are sensitive habitats (within designated sites) within 200 m of a road with a 'potentially significant change'. If there are no designated sites containing sensitive habitats within 200 m of the affected road, then no further assessment is required.

11.4.23 The potentially significant change could be associated with realignment (i.e., increased proximity to receptors), changes to speed (>10 kph) or flow. The applied screening criteria, based on professional judgement, for changes in road traffic flows due to the Proposed Development are as follows:

- A change of light-duty vehicle (LDV) flows of more than 50 annual average daily traffic (AADT) or heavy-duty vehicle (HDV) flows of 10 AADT for roads within 200m of Habitat Regulations Sites;
- A change of light-duty vehicle (LDV) flows of more than 100 annual average daily traffic (AADT) or heavy-duty vehicle (HDV) flows of 25 AADT for roads within 200m of SSSIs; and
- A change of LDV flows of more than 1000 AADT or HDV flows of more than 100 AADT for sensitive habitats within 200m of National Nature Reserves (NNRs) and local nature sites (i.e. ancient woodland, Local Wildlife Sites and Local Nature Reserves (LNRs)).

11.4.24 Based on professional judgement, changes in traffic flows below these criteria are considered to not have the potential to result in significant air quality impacts in isolation.

11.4.25 For identification of potential 'in-combination' effects at Habitat Directive Sites, the threshold of 1,000 AADT is applied to the change in 'in-combination' traffic flows.

Emissions from Railway

11.4.26 Diesel fired stationary locomotives can give rise to high short term NO₂ and SO₂ concentrations near railway stations or depots. Moving locomotives can contribute to elevated short term NO₂ and SO₂ concentrations close to the track. Local Air Quality Management Technical Guidance states that emission from locomotives can be screened out if none of the following criteria are met:

“Stationary diesel or steam locomotives:

- *locations where diesel or steam locomotives are regularly (at least three times a day) stationary for periods of 15-minutes or more; and*
- *Determine relevant exposure within 15m of the locomotives.*

Moving diesel locomotives:

- *relevant exposure within 30m of the railway tracks with heavy traffic of diesel passenger trains; and*
- *the background annual mean NO₂ concentration is above 25µg/m³ in these areas.”*

11.4.27 Based on the above criteria the emissions from locomotives from the restoration of the railway line for passenger and freight services are not significant and have not been considered further in the assessment.

Detailed Assessment

Human Receptors

11.4.28 Concentrations of pollutants (NO₂, PM₁₀ and PM_{2.5}) have been predicted for a range of worst-case locations of relevant human receptor exposure both at sensitive existing properties and within the Proposed Development itself to allow comparison with the NAQOs and (for existing receptors only) determination of the significance of impacts at each receptor. The location of these receptors is presented in **Figure 11.1**.

11.4.29 Emissions from road vehicles and their resultant impact at receptor locations have been predicted using the ADMS-Roads dispersion model (v5.0.0.1). The model requires the user to provide various input data, including traffic flows (in AADT format), vehicle composition (i.e. the proportion of Heavy Duty Vehicles (HDVs)), road characteristics (including road width, gradient and street canyon dimensions, where applicable), and average vehicle speed. AADT flows and the proportions of HDVs, for roads within the study area have been provided by the Project's transport consultants, Stantec. Traffic data used in this assessment are summarised in **Appendix 11.3**.

11.4.30 The model also requires meteorological data and has been run using 2018 meteorological data from the Yeovilton meteorological station, which following a review of the characteristics of the Site and the meteorological site is considered suitable for this area. **Appendix 11.3** provides further details on the model inputs.

11.4.31 Traffic emissions have been calculated using the Emission Factor Toolkit (EFT) v10.1, which utilises NO_x emission factors taken from the European Environment Agency (EEA) COPERT

5.3 emission tool. The traffic data were entered into the EFT to provide emission rates for each of the road links entered in the model. Road vehicular emissions are primarily associated with the exhaust emissions but also include particles generated from abrasion (of tyres, brakes and road). The EFT allows users to calculate road vehicle pollutant emission rates for NO_x, PM₁₀ and PM_{2.5} (exhaust and brake, tyre and road wear) for a specified year, road type, vehicle speed and vehicle fleet composition.

11.4.32 Generally, concentrations of air pollutants in the UK are anticipated to decrease in the coming years as older vehicles are replaced with less polluting newer vehicles; as such, in most cases, the earlier the year that is assessed, the more worst-case the assessment is. The year 2032 has been identified as the assessment year for operational effects. This year has been identified as it is the end of the current Local Plan period and a date by which it is reasonable to assume that the development approved by the LDO will have been delivered.

11.4.33 Therefore, to take account of uncertainties relating to future year vehicle emissions and background pollutant concentrations to provide a conservative assessment, the assessment has been carried out utilising 2030 emission factors and background concentrations combined with traffic data from 2032 (which includes full development flows). This is considered a conservative assumption of emissions in the future.

Ecological Receptors

11.4.34 If a detailed assessment of impacts at ecological receptors is required, in addition to the EFT, emissions of ammonia (NH₃) will be calculated using the Calculator for Road Emissions of Ammonia (CREAM) tool (AQC, 2020b).

11.4.35 The ADMS Roads model will be used to calculate concentrations of NO_x and NH₃ at a range of transects at increasing distances from the adjacent road network. Alongside the nitrogen (and acid), deposition will be calculated using deposition velocities for grassland habitats of 1.5mm/s for NO₂ and 2mm/s for NH₃, and for taller vegetation such as trees of 3mm/s for NO₂ and 30mm/s for NH₃.

Onsite Plant Emissions

11.4.36 Emissions from the onsite energy plant and industrial plant have been modelled using the Breeze AERMOD atmospheric dispersion modelling programme. At this stage the exact emission parameters from the onsite plant are not known, details on the modelling methodology, model input parameters and assumptions are summarised in **Appendix 11.3**.

11.4.37 Concentrations of NO₂ have been predicted for a range of worst-case locations of relevant human health exposure both at sensitive existing properties and within the Proposed Development itself to allow comparison with the NAQOs and (for existing receptors only) determination of the severity of impacts at each receptor. The receptors modelled are the same as identified for the operational road traffic impacts detailed assessment (see Paragraphs 11.4.30 to 11.4.35).

11.4.38 The pollutant concentrations of NO₂, SO₂ and NH₃ were also predicted at specific ecological receptor locations to calculate the Nitrogen Deposition and Acid deposition levels at the ecological sites.

11.4.39 The model assumes that emissions from the energy plant are released from the same flue. At this stage the height and location of the flues are not known and therefore the flue has been modelled at heights of 3m, 10m and 25m from the roof height of the building (35m) as set out in the parameter plans.

11.4.40 The emission from the industrial plant is not known at this stage and therefore flues have been located across the Proposed Development to calculate a ceiling release limit for the Proposed

Development at which there is no significant air quality effect, based on flues at 10m and 25m above the height of the building.

11.4.41 The model has been run with hourly sequential meteorological data from the Yeovilton monitoring station. Data from 2018 have been used to be consistent with the traffic modelling.

11.4.42 The potential entrainment of the plume in the wake of nearby buildings (the so-called building downwash effect) has been considered in the model by including buildings within the model. The modelled buildings and dimensions are presented in **Appendix 11.3**.

Baseline Data Collection

11.4.43 Information on existing air quality has been obtained by collating the results of monitoring carried out by SDC. Background concentrations for the site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid. In addition, existing (2018 to be consistent with the traffic data used in the assessment) and future (2032) baseline concentrations of relevant pollutants have been modelled at existing receptor locations (details on the methodology is presented in Section 11.4).

Sensitive Receptors

11.4.44 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes, etc. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.

11.4.45 Based on these guidelines, seven existing properties have been identified as sensitive residential receptors for the assessment. The locations of residential receptors were chosen to represent locations where impacts from road traffic and plant related to the Proposed Development are likely to be the greatest, i.e., as a result of development traffic at junctions. These locations are presented in **Table 11.5** and shown in **Figure 11.1**. Receptors were modelled at a height of 1.5 m representing ground floor exposure.

11.4.46

Receptor	Location	Height (m)	OS Grid Reference	
			X	Y
R1	7 Woolavington Hill	1.5	334749	141459
R2	Woolavington School	1.5	334480	141522
R3	99 Woolavington Road	1.5	333529	141602
R4	97 Woolavington Road	1.5	333006	141660
R5	79 Woolavington Road	1.5	332564	141535
R6	25 Orchard Close	1.5	331628	141346
R7	Rockfield House, Puriton Hill	1.5	332097	141030
P1	Proposed Receptor 1	1.5	332752	141616
P2	Proposed Receptor 2	1.5	333626	141617
P3	Proposed Receptor 3	1.5	334184	141573

Table 11.5 Human Receptor Locations Assessed

11.4.47 There are no designated ecological sites within 200 m of a road where Project related traffic in isolation exceeds the relevant thresholds (**Table A11.3.3**) and is not considered to be a risk of likely significant effects at ground level. There are several statutory ecological receptors within 10km of the Proposed Development. The Severn Estuary SAC and SPA are located approximately 2.9km west of the Site. The Somerset Moors and Levels SPA is located approximately 3.5km east of the Site. The Huntspill National Nature Reserve is adjacent to the north of the Site. These locations are described in **Appendix 11.4** and shown in **Figure 11.2**.

Assessment of Significance

Construction Phase

11.4.48 The IAQM guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations.

11.4.49 With appropriate mitigation in place, the IAQM guidance indicates that the residual effect dust emissions associated with the demolition and construction can be classified as being 'not significant'.

Operational Phase

Human Receptors

11.4.50 The relevant NAQOs are set out in **Table 11.1** and **Table 11.2**. The predicted pollutant concentrations in the future year (2032) at each identified sensitive receptor have been compared to the relevant NAQOs and any exceedances identified.

11.4.51 Analysis of long-term monitoring data suggests that if the annual mean NO₂ concentration is less than 60 µg/m³ then the 1-hour mean NO₂ NAQO is unlikely to be exceeded where road

transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the one-hour mean objective is likely to be achieved (DEFRA, 2018a). Analysis of long-term monitoring data also suggests that if the annual mean PM₁₀ concentration is less than 32 µg/m³ then the 24-hour mean PM₁₀ NAQO is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the 24-hour mean NAQO is likely to be achieved.

11.4.52 There is no official guidance in the UK on how to assess the significance of the air quality impacts of existing air quality on a new development. The assessment of proposed receptors within the Site has therefore been limited to predicting pollutant concentrations at worst-case receptors within the Site and comparing these predicted concentrations to the relevant NAQOs, with the overall significance being based on whether the NAQOs for each pollutant are exceeded or not.

11.4.53 There is no official guidance in the UK on how to assess the significance of the air quality impacts of a new development on existing receptors. The approach developed by EPUK and the IAQM (EPUK / IAQM, 2017), which considers the change in air quality as a result of a Proposed Development on existing receptors in combination with baseline concentrations at the receptors, has therefore been used. The guidance sets out three stages: determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance. Impact magnitude relates to the change in pollutant concentration; the impact description relates this change to the air quality objective and is shown in **Table 11.6**.

Long term average Concentration at receptor in assessment year	% Changes in Concentration with development in relation to NAQO / Limit Value			
	1*	2-5	6-10	>10
> 110 % ^a	Moderate	Substantial	Substantial	Substantial
>102% - ≤110% ^b	Moderate	Moderate	Substantial	Substantial
>95% - ≤102% ^c	Minor	Moderate	Moderate	Substantial
>75% - ≤95% ^d	Negligible	Minor	Moderate	Moderate
≤75% ^e	Negligible	Negligible	Minor	Moderate

Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.

% change rounded to nearest whole number. Where the % change is 0 (i.e., Less than 0.5%) the impact will be Negligible.

To align with the terminology used in the ES the term 'slight' used by the IAQM has been changed to 'minor'

^a NO₂ or PM₁₀: > 44 µg/m³ annual mean; PM_{2.5}>27.5 µg/m³ annual mean; PM₁₀ >35.2 µg/m³ annual mean (days).

^b NO₂ or PM₁₀: > 40.8 – ≤ 44 µg/m³ annual mean; PM_{2.5}> 20.4 – ≤22 µg/m³ annual mean; PM₁₀ >32.64 – ≤35.2 µg/m³ annual mean (days).

^c NO₂ or PM₁₀: > 38 – ≤40.8 µg/m³ annual mean; PM_{2.5}>19 – ≤20.4µg/m³ of annual mean; PM₁₀ >30.4 – ≤32.64 µg/m³ annual mean (days).

^d NO₂ or PM₁₀: >30 - ≤38 µg/m³ annual mean; PM_{2.5}>15 - ≤19 µg/m³ annual mean; or <24 - ≤ 30.4 µg/m³ annual mean (days).

^e NO₂ or PM₁₀: ≤30 µg/m³ annual mean; PM_{2.5}≤15 µg/m³ annual mean; PM₁₀ ≤24 µg/m³ annual mean (days).

Table 11.6 Impact Significance Criteria

11.4.54 The guidance states that the overall assessment of significance should be based on professional judgement, taking into account factors including:

- the number of properties affected by 'Slight', 'Moderate' or 'Substantial' adverse air quality impacts and a judgement on the overall balance;

- the magnitude of the changes and the descriptions of the impacts at the receptors;
- whether or not an exceedance of an NAQO or limit value is predicted to arise in the operational study area (where there are significant changes in traffic) where none existed before, or an exceedance area is substantially increased;
- the uncertainty, comprising the extent to which worst-case assumptions have been made; and
- the extent to which an NAQO or limit value is exceeded.

11.4.55 Therefore, where impacts at an individual receptor are classified as 'Negligible' or 'Slight', effects would typically be considered 'not significant'. However, where 'Moderate' or 'Substantial' adverse impacts are identified at individual receptors, the overall effect needs to be considered in the round taking into account the changes at all of the modelled receptor locations, with a judgement made as to whether the overall air quality effect of the development is 'significant' or not.

Ecological Receptors

11.4.56 In terms of the impact of road traffic emissions on ecological receptors, an impact of less than 1% of the critical level or load is accepted to be a pragmatic threshold for determining no likely significant effects (Natural England, 2018). It should be noted that an impact of more than 1% is not, per se, an indication that a significant effect exists, only the possibility of one which would trigger the need for further, more detailed assessment of the ecological sensitivity and value of the habitat.

11.4.57 Where the predicted impact exceeds 1%, consideration needs to be given to the overall critical level or load. Where the critical level or load is exceeded, input is required from the Project's ecological consultants to ascertain the potential significance of the impact and resultant effects.

11.4.58 The Environment Agency's Operational Instruction 66_12 (Environment Agency, 2012) details how the air quality impacts on ecological sites should be assessed. This guidance provides risk-based screening criteria to determine whether impacts will have 'no likely significant effects (alone and in-combination)' for European sites, and 'no likely damage' for SSSIs. These criteria are as follows:

- Process contribution (PC) does not exceed 1% long-term critical level or load or that the PEC does not exceed 70% long-term critical level and/or critical load for European sites and SSSIs; and
- PC does not exceed 10% short-term critical level for NO_x for European sites and SSSIs;

11.4.59 Where impacts cannot be classified as resulting in 'no likely significant effect', more detailed assessment may be required depending on the sensitivity of the feature in accordance with EAs Operational Instruction 67_12 ('Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation'). This can require the consideration of the potential for in-combination effects, the actual distribution of sensitive features within the site, and local factors (such as the water table).

11.4.60 The guidance provides the following further criteria:

- if the predicted environmental concentration (PEC) does not exceed 100% of the appropriate limit it can be assumed there will be no adverse effect;
- if the background is below the limit, but a small PC leads to an exceedance - decision based on local considerations;

- if the background is currently above the limit and the additional PC will cause a small increase - decision based on local considerations;
- if the background is below the limit, but a significant PC leads to an exceedance - cannot conclude no adverse effect; and
- if the background is currently above the limit and the additional PC is large - cannot conclude no adverse effect.

Limitations

- 11.4.61 There are many components that contribute to the uncertainty in predicted concentrations. The models used in this assessment are dependent upon the traffic and plant data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.
- 11.4.62 There has been an acknowledged disparity between national road transport emissions projections and measured annual mean concentrations of nitrogen oxides (NO_x) and NO₂ for many years. Recent monitoring has shown that reductions in concentrations are now being measured in many parts of the country (Air Quality Consultants Ltd., 2020), however, there is still some uncertainty regarding the rate at which emissions will reduce in the future and therefore some consideration must be given to the accuracy of any projection and to appropriately respond to this.
- 11.4.63 Baseline traffic data was collected by the transport consultant, Stantec, in 2018 prior to the COVID-19 pandemic. 2018 flows have been used to inform the baseline air quality assessment as restrictions on movement implemented by the Government in response to the Covid-19 pandemic placed limitations on collecting more recent data.
- 11.4.64 The complete development modelling has been based on 2030 emission factors and background concentrations, whilst utilising traffic flows for 2032. The model has been verified against 2018 monitoring data to be consistent. This is considered to provide an appropriately conservative assessment considering the uncertainties regarding future vehicle emission factors.
- 11.4.65 The assessment has been undertaken assuming that there will be no reduction in baseline deposition in the future, as this is not accounted for within the APIS website predictions. Reductions in baseline deposition are likely to occur because of improvements in background pollutant concentrations in the future, partly from reductions in vehicle emissions.

11.5 Baseline Conditions

Current State of the Environment

EU Limit Values

- 11.5.1 The study area does not contain any predicted or measured exceedances of an EU Limit Values either in the current year (2018) or in the future year (2032). The study area is not within a zone where DEFRA have reported an exceedance of an EU Limit Values either in the 'existing' baseline year (2018) or in future years.

LAQM

- 11.5.2 SDC has investigated air quality within its area as part of its responsibilities under the LAQM regime. To date, no AQMAs have been declared because of exceedances of the NAQOs.

Local Monitoring Data

NO₂

- 11.5.3 The Council deployed NO₂ diffusion tubes at 32 locations in 2019, including one location within the study area. 2015-2019 monitoring results for the most representative and closest monitoring location to the Site are shown in **Table 11.7**.

Site ID	Site Type	Within AQMA	Annual Mean (µg/m ³)				
			2015	2016	2017	2018	2019
DT33 Bristol Road, Dunball	Roadside	N	34.6	33.6	34.3	32.4	29.4
NAQO			40				

2015 – 2019 data taken from the SDC 2020 Air Quality Annual Status Report (SDC, 2020).

Table 11.7 Measured Annual Mean NO₂ Concentrations 2015 – 2019

- 11.5.4 Measured concentrations at the Bristol Road, Dunball monitor have been well below the annual mean objective between 2015 and 2019.

PM₁₀ and PM_{2.5}

- 11.5.5 SDC carries out PM₁₀ and PM_{2.5} monitoring at four automatic monitoring stations, the nearest of which is located 4 km from the Proposed Development, given the distance to the Proposed Development it is not considered to be representative of concentrations at the Site.

Estimated Background Concentrations

- 11.5.6 Estimated background concentrations for the Site have been obtained from the latest 2018-based national maps provided by Defra (Defra, 2020b). The Defra background concentrations for the study area are provided in **Table 11.8**. The background concentrations are all well below the relevant NAQOs both in the 'existing' and future years.

Year	Location	Annual Mean (µg/m ³)		
		NO ₂	PM ₁₀	PM _{2.5}
2018	331_140 ^a	14.4	14.0	8.8
	334_141	7.1	11.8	7.6
	333_141	6.9	11.1	7.3
	332_141	8.8	11.9	7.8
	331_141	15.2	14.4	8.9
2030	334_141	4.9	10.7	6.7
	333_141	4.6	10.1	6.4
	332_141	5.5	10.9	6.9
	331_141	8.2	13.3	7.9
NAQOs		40	40	20

^a Location of monitoring site used for verification.

Note: Projections in the 2018 reference year background maps and associated tools are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these tools do not reflect short- or longer-term impacts on emissions in 2020 and beyond resulting from behavioural change during the national or local lockdowns.

Table 11.8 Estimated Annual Mean Background Concentrations

Baseline Deposition – Ecological Receptors

- 11.5.7 The three-year average (2017 - 2019) nitrogen and acid deposition rates for each of the ecological receptors with habitats that are sensitive to either nitrogen or acid deposition are presented in **Table 11.9** data have been taken from the APIS website (APIS, 2020). The APIS data does not include future year predictions and therefore on a conservative basis, the APIS baseline is assumed constant for the future year assessments.

Receptor	Total Nitrogen Deposition (kgN/ha/yr)	Acid Deposition		Ammonia (µg/m³)
		Nitrogen (keqN/ha/yr)	Sulphur (keqS/ha/yr)	
Severn Estuary SAC (E1, E4)	19.34	Not sensitive		2.94
Severn Estuary SAC (E2, E3, E5)	13.96			1.89
Severn Estuary SAC (E6-E11)	21.93			3.5
Critical Load/Level	20			3
Severn Estuary SPA (E27)	19.34	Not sensitive		2.94
Severn Estuary SPA (E28-29)	13.96			1.89
Severn Estuary SPA (E30-32)	21.93			3.5
Critical Load/Level	20			3
Somerset Levels and Moors SPA (E12-E19)	20.97	1.498	0.119	3.21
Critical Load/Level	20	0.5493	0.1833	3
Somerset Levels and Moors SPA (E20-E24)	20.15	1.439	0.118	2.97
Critical Load/Level	20	4.446	4.08	3
Somerset Levels and Moors SPA (E25-E26)	19.82	1.416	0.112	3.03
Critical Load/Level	20	1.053	0.83	3

Exceedances of the critical level/critical load are highlighted in bold.

Table 11.9 Baseline Deposition Rates

Predicted Baseline Concentrations – Human Receptors

- 11.5.8 The ADMS-Roads model has been used to predict baseline NO₂, PM₁₀ and PM_{2.5} concentrations at each of the existing receptor locations identified. The results for the 2018 (i.e., the current state of the environment) are presented in **Table 11.10**.

Receptor	NO ₂	PM ₁₀	PM _{2.5}
R1	14.1	13.0	8.3
R2	9.3	12.1	7.8
R3	10.8	11.7	7.6
R4	11.2	11.8	7.6
R5	14.0	12.7	8.2
R6	47.5	18.8	11.6
R7	23.8	14.6	9.4
NAQOs	40	40	20

Exceedances of the NAQOs are highlighted in bold.

Table 11.10 Predicted Baseline Annual Mean Concentrations (µg/m³) of NO₂, PM₁₀ and PM_{2.5} in 2018

11.5.9 Predicted concentrations of NO₂ exceed the relevant NAQO at one existing receptor (R6) in 2018. PM₁₀ predicted concentrations are well below the relevant NAQOs at all existing receptors.

11.5.10 None of the predicted annual mean NO₂ concentrations exceed 60 µg/m³ and therefore exceedance of the 1-hour mean NO₂ NAQO is unlikely.

11.5.11 None of the predicted annual mean PM₁₀ concentrations exceed 32 µg/m³ and therefore the 24-hour mean PM₁₀ NAQO is not predicted to be exceeded.

2032 Baseline

11.5.12 The ADMS-Roads model has been used to predict baseline NO₂, PM₁₀ and PM_{2.5} concentrations at each of the existing receptor locations identified. The results for the 2032 baseline scenario are presented in **Table 11.11**.

Receptor	NO ₂	PM ₁₀	PM _{2.5}
R1	7.8	12.3	7.6
R2	6.0	11.3	7.0
R3	6.5	11.1	7.0
R4	6.9	11.2	7.1
R5	7.6	11.9	7.5
R6	21.3	18.9	11.1
R7	10.3	13.5	8.4
NAQOs	40	40	20

Table 11.11 Predicted Baseline Annual Mean Concentrations (µg/m³) of NO₂, PM₁₀ and PM_{2.5} in 2032

11.5.13 The annual mean NO₂, PM₁₀ and PM_{2.5} NAQOs are not predicted to be exceeded at any of the existing receptor locations in 2032. Furthermore, predicted concentrations of NO₂ are lower than 60 µg/m³ indicating that it is unlikely that any exceedances of the 1-hour mean NAQO have occurred, and predicted concentrations of PM₁₀ are lower than 32 µg/m³ indicating that it is unlikely that any exceedances of the 24-hour mean NAQO have occurred.

11.5.14 Overall, baseline concentrations of the pollutants considered are predicted to decrease between 2018 and 2032 as vehicle emission factors and background concentrations are assumed to improve, despite the traffic increase on the network.

11.6 Embedded Mitigation

Construction Phase

11.6.1 A Framework Demolition and Construction Environmental Management Plan (FDCEMP) which will manage the construction traffic effects as well as potential construction dust, will be submitted with the ES. The following mitigation measures, with regard to high-risk sites, from the IAQM guidance (IAQM, 2014) are recommended. This is secured within the Compliance Form.

Communication

- Develop and implement a stakeholder communications plan.
- Display the name and contact details of persons accountable on the Site boundary.
- Display the head or regional office information on the Site boundary.

Management

- Develop and implement a dust management plan.
- Record all dust and air quality complaints, identify causes and take measures to reduce emissions.
- Record exceptional incidents and action taken to resolve the situation.
- Carry out regular site inspections to monitor compliance with the dust management plan and record results.
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken.
- Agree dust monitoring locations with the local authority and instigate monitoring 3 months in advance of works commencing in the area.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary at least as high as any stockpile on site.
- Fully enclose Site or specific operations where there is a high potential for dust production and the Site is active for an extensive period.
- Avoid site run off of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove potentially dusty materials from Site as soon as possible.
- Cover, seed, or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary.
- Avoid the use of diesel- or petrol-powered generators where possible.
- Produce a Construction Logistics Plan to manage the delivery of goods and materials.
- Only use cutting, grinding, and sawing equipment with dust suppression equipment.
- Ensure an adequate supply of water on-site for dust suppressant.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate.

- Ensure equipment is readily available on-site to clean up spillages of dry materials.
- No on-site bonfires and burning of waste materials on-site.

Demolition

- Incorporate soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure water suppression is used during demolition operation.
- Avoid explosive blasting, using appropriate manual and mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Earthworks

- Re-vegetate earthworks and exposed areas /soil stockpiles to stabilise surfaces as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored silos with suitable emissions control systems.
- Crushers shall be totally contained or fitted with a water suppression system.

Trackout

- Use water assisted dust sweepers on the Site access and local roads.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving the Site are covered to prevent escape of materials.
- Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable.
- Install hard surfaced haul routes which are regularly damped down.
- Install a wheel wash with a hard-surfaced road to the Site exit where site layout permits.
- The Site access gate to be located at least 10m from receptors where possible.
- To utilise the Gravity link road for construction traffic to avoid impacts in adjacent villages and if appropriate to use the existing secondary access on the eastern boundary for construction when appropriate, to reduce movements in Woolavington.

Operational Phase

- 11.6.2 The completion of the Gravity Link Road and associated highway works, and the Village Enhancement Scheme will provide a new direct link into the Proposed Development from the

A39 Puriton Hill and M5 Junction 23 bypassing local villages and reducing the impact on air quality. The use of existing secondary access on the eastern boundary is also proposed if this helps to reduce movements in Woolavington.

- 11.6.3 A site wide Framework Travel Plan (as detailed in **Chapter 9: Access and Transport**) will be implemented to actively monitor and manage the operational transport effects with the aim of increasing the number of journeys made by sustainable modes of transport.
- 11.6.4 Effective mitigation options for the proposed energy and industrial plant (such as low-NO_x burners, abatement and appropriate stack height and would be set out in the Design Code) are typically required by other regulatory regimes and therefore considered to be embedded within the design of the Proposed Development.

11.7 Assessment of Likely Effects

Construction Phase Dust Emissions

Screening Assessment

- 11.7.1 There are a number of existing sensitive human receptors (residential properties) located within 350 m of the Site boundary and within 50 m of the routes that will be used by demolition and construction vehicles. As such, further assessment of the risk of dust soiling and PM₁₀ emissions is required.
- 11.7.2 The Huntspill River National Nature Reserve (NNR) is located within 250 m of the Site boundary and there are ten Local Wildlife Sites (LWS) located within or adjacent to the Site: Puriton Rhynes and Ponds; Borrow Pit, Stoning Pound Field and Rhyne, Woolavington Road and Fields North, Puriton Cowslip Field, Puriton Ash Ground, Northmead Drove Fields, Puriton Meadows and Rail Spur, New Ground Covert, South Hills Wood. As such, further assessment of the ecological impacts because of dust soiling is required.

Further Assessment

Dust Emission Magnitude

- 11.7.3 The dust emissions magnitude of demolition, earthworks and construction activities and as a result of track out have been determined based the criteria shown in **Appendix 11.2**.
- 11.7.4 Most of the demolition of the former ROF Site has been undertaken. However, there are a limited number of buildings remaining that will require to be demolished to accommodate the LDO. Based on this, the dust emission magnitude of demolition activities is judged to be 'medium'.
- 11.7.5 The Site is approximately 264.54 hectares (2,615,400 m²) in area and soil at the Site is moderately dusty. Based on this, the dust emission magnitude of earthworks activities is judged to be 'large'.
- 11.7.6 Construction activities comprise the construction of a range of buildings on the Site, with a total building volume of more than 100,000 m². Based on this, and despite phasing of construction, the dust emission magnitude of construction activities is judged to be 'large'.
- 11.7.7 The number of HDVs that will exit the Site daily during the peak construction phase is estimated to be 27 per day. Based on this, the dust emission magnitude of trackout is judged to be 'medium'.

Area Sensitivity

- 11.7.8 The area sensitivity to dust soiling and human health impacts has been determined based on the criteria shown in **Appendix 11.2**.
- 11.7.9 Residential properties are classed as being 'high sensitivity' receptors to dust soiling, based on the IAQM guidance (IAQM, 2014) (see **Table A11.2.2, Appendix 11.2**). There are approximately 20 residential properties located within 20 m of the Site boundary; in addition, there will temporary construction housing within the Site boundary as such, the sensitivity of the area surrounding the Site to dust soiling (**Table A11.2.3**) is judged to be 'high'.
- 11.7.10 The IAQM guidance states that track out may occur for distance of up to 500 m from large sites. As the demolition and construction traffic routing is currently unknown, the worst-case assumption has been made that all main roads may potentially be used by HDVs leaving the Site entrance(s). There are between 10 and 100 residential properties located within 20 m of roads extending up to 500 m of the Site; as such, the sensitivity to dust soiling of the area surrounding roads along which material may be tracked is judged to be 'high'.
- 11.7.11 The IAQM also defines residential properties as being 'high sensitivity' receptors to human health impacts (see **Table A11.2.2, Appendix 11.2**). PM₁₀ concentrations at existing residential properties within the study area will be similar to the maximum of the predicted 2018 PM₁₀ concentrations at Receptor 6 (i.e., 18.8 µg/m³). Based on the predicted existing PM₁₀ concentrations and the number of sensitive receptors within 20 m of the Site boundary and roads along which material may be tracked, the sensitivity to human health impacts of the areas surrounding the Site and the area surrounding roads along which material may be tracked (**Table A11.2.4**) are judged to be 'medium'.
- 11.7.12 NNRs with dust sensitive features are classed as being 'high sensitivity' receptors to dust deposition, based on the IAQM guidance (IAQM, 2014) (see **Table A11.2.2, Appendix 11.2**). There is one NNR (Huntspill River) located adjacent to the Site boundary; as such, the sensitivity of the area surrounding the Site to dust soiling (**Table A11.2.5**) is judged to be 'high'.

Risk of Impacts

- 11.7.13 The risk of construction dust impacts, without mitigation, have been defined based on the criteria shown in **Appendix 11.2** and are presented in **Table 11.12**.

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	High	High	Medium
Human Health	Medium	Medium	Medium	Medium
Ecology	Medium	High	High	Medium

Table 11.12 Risk of Construction Dust Impacts

- 11.7.14 Overall, therefore, based on **Table 11.12**, appropriate mitigation measures corresponding to a 'high risk' site are required during the construction phase of the Proposed Development (as detailed in **paragraph 11.6.1**).

Construction Traffic

- 11.7.15 During the construction period, the increase in heavy duty vehicles (HDVs) movements on the road network will be below the threshold of 100 movements per day outside an Air Quality Management Area (AQMA) for an assessment to be necessary according to Environmental Protection UK (EPUK) and IAQM guidance. The maximum increase in HDV movements is 54

per day, the construction traffic impacts on human health receptors in the area are likely to be insignificant and have therefore been scoped out of this assessment.

Site Suitability

11.7.16 Predicted concentrations at modelled receptor locations are presented in **Table 11.13**.

Receptor	NO _x	PM ₁₀	PM _{2.5}
P1	10.0	12.0	7.5
P2	11.4	11.1	7.0
P3	9.0	11.4	7.1
Objectives	40	40	20

Table 11.13 Predicted Concentrations of NO₂, PM₁₀ and PM_{2.5} (µg/m³) at On-Site Receptors in 2032

11.7.17 Predicted concentrations of NO₂, PM₁₀ and PM_{2.5} are well below the relevant NAQOs at all worst-case receptors, therefore, air quality within the Proposed Development, without mitigation, will be acceptable.

Operational Phase Road Traffic

11.7.18 Predicted concentrations of NO₂, PM₁₀ and PM_{2.5} at existing receptors, both without and with the Proposed Development in place, are presented in **Table 11.14**, **Table 11.15**, and **Table 11.16**. The 'without development' scenario predicted concentrations include background concentrations and emissions from existing traffic, and the 'with development' scenario predicted concentrations include background concentrations, emissions from existing traffic and traffic generated by the Proposed Development.

Receptor	2032 Without Development	2032 With Development	Change (as % of NAQO)	Impact Descriptor
R1	7.8	7.8	0%	Negligible
R2	6.0	6.0	0%	Negligible
R3	6.5	6.5	0%	Negligible
R4	6.9	6.9	0%	Negligible
R5	7.6	7.6	0%	Negligible
R6	21.3	21.5	1%	Negligible
R7	10.3	10.3	0%	Negligible
Objectives	40		-	

Table 11.14 Predicted Concentrations of NO₂ (µg/m³), % Change and Impact at each Receptor

Receptor	2032 Without Development	2032 With Development	Change (as % of NAQO)	Impact Descriptor
R1	12.3	12.4	0%	Negligible
R2	11.3	11.3	0%	Negligible
R3	11.1	11.1	0%	Negligible
R4	11.2	11.2	0%	Negligible
R5	11.9	11.9	0%	Negligible
R6	18.9	19.0	0%	Negligible
R7	13.5	13.5	0%	Negligible
Objectives	40		-	

Table 11.15 Predicted Concentrations of PM₁₀ (µg/m³), % Change and Impact at each Receptor

Receptor	2032 Without Development	2032 With Development	Change (as % of NAQO)	Impact Descriptor
R1	7.6	7.6	0%	Negligible
R2	7.0	7.0	0%	Negligible
R3	7.0	7.0	0%	Negligible
R4	7.1	7.1	0%	Negligible
R5	7.5	7.5	0%	Negligible
R6	11.1	11.2	0%	Negligible
R7	8.4	8.4	0%	Negligible
Objectives	20		-	

Table 11.16 Predicted Concentrations of PM_{2.5} (µg/m³), % Change and Impact at each Receptor

11.7.19 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations in 2032, both without and with the Proposed Development in place, are below the relevant NAQOs at all existing receptors. Furthermore, predicted annual mean NO₂ concentrations are below 60µg/m³ at all receptors, indicating that exceedances of the 1-hour mean NO₂ NAQO are not likely, and the predicted annual mean PM₁₀ concentrations are below 32 µg/m³ at all receptors, indicating that exceedances of the 24-hour mean PM₁₀ NAQO are not likely.

11.7.20 The changes in annual mean NO₂ concentrations (when rounded to the nearest whole number) range from 0% at six receptors and 1% at one receptor; using the criteria set out in **Table 11.6**, these impacts are described as being 'Negligible' at all receptors.

11.7.21 The changes in annual mean PM₁₀ and PM_{2.5} concentrations (when rounded to the nearest whole number) are 0% at all receptors; using the criteria set out in **Table 11.6**, the PM₁₀ and PM_{2.5} impacts are described as being 'Negligible' at all receptors.

Operational Phase Plant Emissions

Energy Plant

11.7.22 The maximum predicted PCs at the sensitive receptor locations for the energy plant are presented in **Table 11.17** based on an NO_x emission ceiling rate of 5g/s and an SO₂ ceiling rate of 2g/s, to avoid adverse air quality effects. Results of the other emissions rates and stack heights are presented in **Appendix 11.6**.

Receptor	3m		10m		25m	
	PC	%PC	PC	%PC	PC	%PC
Human Health						
Maximum NO ₂	1.2	3	1.2	3	1.0	3
Ecological Receptors						
Maximum NO _x	1.2	4	1.1	4	1.0	3
Maximum SO ₂	0.48	2	0.45	2	0.39	2
Maximum Nitrogen Deposition	0.04	0	0.03	0	0.03	0
Maximum Acid Deposition	0.015	4.1	0.014	3.8	0.013	3.4

Table 11.17 Maximum Energy Plant Concentrations

11.7.23 Based on the maximum concentrations presented in Table 11.14 the impact of the energy plant assuming a NO_x emission ceiling of 5g/s is not significant. As presented in **Appendix**

11.6 higher emission rates are likely to be acceptable but will need to be considered through the Design Guide.

Industrial Plant

11.7.24 The maximum predicted PCs at the sensitive receptor locations for the industrial plant are presented in **Table 11.18** based on emission ceiling rates (to avoid adverse air quality effects) for NO_x of 10g/s, for SO₂ of 5g/s, for NH₃ of 0.65g/s, for PM₁₀ of 5g/s, PM_{2.5} of 2g/s. Results for other emissions rates are presented in **Appendix 11.6**.

Receptor	10m		25m	
	PC	%PC	PC	%PC
Human Health				
Maximum NO ₂	2.65	6.6	2.39	6.0
Maximum PM ₁₀	1.89	4.7	1.71	4.3
Maximum PM _{2.5}	0.76	3.8	0.68	3.4
Maximum Benzene	0.38	7.6	0.34	6.8
Ecological receptors				
Maximum NO _x	2.07	6.9	1.81	6.0
Maximum SO ₂	0.34	1.7	0.29	1.4
Maximum NH ₃	0.045	1	0.037	1
Maximum Nitrogen Deposition	0.3	1.5	0.3	1.3
Maximum Acid Deposition	0.049	13.4	0.042	11.5

Table 11.18 Maximum Industrial Plant Concentrations

11.7.25 Based on the maximum concentrations presented in **Table 11.18** the impact of the industrial plant assuming a NO_x emission ceiling of 10g/s is not significant. As presented in **Appendix 11.6** higher emission rates are likely to be acceptable but will need to be considered through the Design Guide.

Ecological Effects

11.7.26 Full results for the ecological assessment are provided in **Appendix 11.6**.

11.7.27 The NO_x critical level is predicted to be met at Severn Estuary SAC with the Proposed Development. The nitrogen deposition critical load with the development in place is predicted to be met at five receptor locations and exceeded at six receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations. The increase in nitrogen deposition is below the 1% threshold at all receptor locations. The NH₃ critical level is predicted to be met at Severn Estuary SAC with the Proposed Development, at five receptor locations and exceeded at six receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations the increase in concentration is below the 1% threshold at all receptor locations.

11.7.28 The NO_x critical level is not predicted to be exceeded at the Severn Estuary SPA with the Proposed Development. The nitrogen deposition critical load with the development in place is predicted to be met at three receptor locations and exceeded at three receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations. The increase in nitrogen deposition is below the 1% threshold at all receptor locations. The NH₃ critical level is predicted to be met at Severn Estuary SPA with the Proposed Development, at three receptor locations and exceeded at three receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations the increase in concentration is below the 1% threshold at all receptor locations.

11.7.29 The NO_x critical level is not predicted to be exceeded at the Somerset Levels & Moors SPA with the Proposed Development. The nitrogen deposition critical load with the development in place is predicted to be met at three receptor locations and exceeded at thirteen receptor locations within the Somerset Levels & Moors SPA, this is due to the baseline deposition rate exceeding the critical load at these locations. The increase in nitrogen deposition is below the 1% threshold at all receptor locations.

11.7.30 The increase in acid deposition is below the 1% threshold for significance at seven receptor locations and above the 1% threshold for significance at eight receptor locations. The NH₃ critical level is predicted to be exceeded at the Somerset Levels & Moors SPA with the

locations, this is due to the baseline rate exceeding the critical load, the increase in concentration is below the 1% threshold at all receptors.

11.7.31 The NO_x critical level is not predicted to be exceeded at the Huntspill NNR with the Proposed Development.

11.7.32 Given the magnitude of the predicted increases in concentration and deposition rates the impact of the Proposed Development on the ecological sites can be screened out as not significant.

11.8 Further Mitigation

Construction

11.8.1 No further mitigation measures are required.

Operation

11.8.2 No further mitigation measures are required.

11.9 Residual Effects

Construction

11.9.1 With appropriate mitigation in place the construction phase residual effects are negligible.

Operation

11.9.2 The operational phase residual effects are negligible.

11.10 Monitoring

11.10.1 No significant residual adverse air quality effects are identified and therefore monitoring is not proposed for the operation of the Development. During the construction phase dust monitoring is proposed as part of the embedded mitigation.

11.11 Summary

11.11.1 The air quality effects associated with the construction and operation of the Proposed Development have been assessed.

11.11.2 The construction works have the potential to create dust. During construction a package of mitigation measures will be put in place through the FDCMP to minimise the risk of elevated PM₁₀ concentrations and dust nuisance in the surrounding area. With mitigation in place the construction impacts are judged as being not significant.

11.11.3 Baseline concentrations of NO₂ and particulate matter (PM₁₀ and PM_{2.5}) have been predicted at sensitive receptor locations. There are predicted exceedances of the annual mean NO₂ objective in 2018 at one receptor location (R6) adjacent to the M5. Concentrations of NO₂ at all other receptors are predicted to be below the objective. Concentrations of PM₁₀ and PM_{2.5} are predicted to be below the relevant objectives in 2018 and 2032.

11.11.4 Concentrations of NO₂, PM₁₀ and PM_{2.5} have been predicted without and with the development in place. The impacts predicted at all individual receptor locations are described as negligible and the overall air quality effects of emissions generated by the development are not significant.

11.11.5 No additional mitigation is required to reduce the direct effects of the development on local air quality.

11.12 Referencing

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- Statutory Instrument 2002, No 3034, 'The Air Quality (England) (Amendment) Regulations 2002' HMSO, London.
- Statutory Instrument 2010, No. 1001, 'The Air Quality Standards Regulations 2010' HMSO, London.
- Statutory Instrument 2016, No. 1184, 'The Air Quality Standards (Amendment) Regulations 2016' HMSO, London.
- Statutory Instrument 2017, No. 1012, 'The Conservation of Habitats and Species Regulations 2017' HMSO, London.

12 Biodiversity

12.1 Introduction

12.1.1 This Chapter presents an assessment of the likely significant ecological effects of the Proposed Development. It begins with a description of the methods used in the assessment. This is followed by a description of the relevant baseline conditions of the Site and surrounding area, together with an assessment of the likely significant effects of the Proposed Development during demolition and construction works and once the Proposed Development is completed and operational. Mitigation measures are identified where appropriate to avoid, reduce or offset any adverse effects identified and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

12.1.2 This Chapter is supported by the following appendices:

- **Appendix 12.1:** Habitat Survey Report
- **Appendix 12.2:** Bat Activity Survey Report
- **Appendix 12.3:** Bat Roost Survey Report
- **Appendix 12.4:** Badger Survey Report
- **Appendix 12.5:** Bird Survey Report
- **Appendix 12.6:** Great Crested Newt Survey Report
- **Appendix 12.7:** Reptile Survey Report
- **Appendix 12.8:** Water Vole Survey Report
- **Appendix 12.9:** Invertebrate Survey Report
- **Appendix 12.10:** SSSI unit condition summary
- **Appendix 12.11:** Biodiversity Impact Assessment Calculations
- **Appendix 12.12:** Shadow Habitats Regulations Assessment

12.1.3 This Chapter has been prepared by Ecology Solutions. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.

12.2 Policy, Legislation, Guidance and Standards

Legislative Framework

12.2.1 The applicable legislative framework is summarised as follows:

- The Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019);
- Wildlife and Countryside Act 1981 (as amended);

- The Protection of Badgers Act 1992;
- The Hedgerow Regulations 1997;
- Countryside and Rights of Way Act 2000; and
- Natural Environment and Rural Communities Act 2006 (sections 40 and 41).

12.2.2 Consideration has also been given to the forthcoming Environment Bill that is currently subject to examination by UK Parliament.

National Planning Policy

12.2.3 The National Planning Policy Framework (NPPF) sets out the Government's requirements for the planning system and was first published on 27th March 2012. The most recent version was published on 20th July 2021.

12.2.4 The key element of the NPPF is that there should be "a presumption in favour of sustainable development" (paragraphs 10 to 11). It is important to note this presumption "does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site" (paragraph 182). 'Habitats site' has the same meaning as the term 'European site' as used in the Habitats Regulations 2017.

12.2.5 Hence the direction of Government policy is clear; that is, the presumption in favour of sustainable development is to apply in circumstances where there is potential for an effect on a European site, if it has been shown that there will be no adverse effect on that designated site as a result of the development in prospect.

12.2.6 The NPPF also considers the strategic approach that Local Authorities should adopt with regard to the protection, maintenance and enhancement of green infrastructure, priority habitats and ecological networks, and the recovery of priority species.

12.2.7 Paragraphs 179 to 181 of the NPPF comprise a number of principles that Local Authorities should apply, including encouraging opportunities to incorporate biodiversity in and around developments; provision for refusal of planning applications if significant harm cannot be avoided, mitigated or compensated for; applying the protection given to European sites to potential Special Protection Areas (SPAs), possible Special Areas of Conservation (SACs), listed or proposed Ramsar sites and sites identified (or required) as compensatory measures for adverse effects on European sites; and the provision for the refusal for developments resulting in the loss or deterioration of 'irreplaceable' habitats – unless there are 'wholly exceptional reasons' (for instance, infrastructure projects where the public benefit would clearly outweigh the loss or deterioration of habitat) and a suitable compensation strategy exists.

12.2.8 National policy therefore implicitly recognises the importance of biodiversity and that with sensitive planning and design, development and conservation of the natural heritage can co-exist, and benefits can, in certain circumstances, be obtained.

Local Planning Policy

12.2.9 The Sedgemoor Local Plan (SLP) was adopted in February 2019 and is the current document in use for development management purposes. This succeeds the prior Sedgemoor Core Strategy which allocated the 616-acre site as a commercial development opportunity.

12.2.10 The Core Strategy was informed by the 2009 Bridgwater Vision, updated in 2015, which identified the site as a transformational opportunity. The Vision provides a guide to

development to 2060 included the Huntspill Energy Park (HEP) as a one of the character areas for the Vision. Within the design principles it states that careful landscape design will be used to maintain and enhance biodiversity.

- 12.2.11 The Puriton Energy Park Supplementary Planning Document (SPD) was adopted in 2012 and was part of a strategy to create a proactive response to site development to accelerate site disposal and regeneration. It that respect the Core Strategy and the SPD have been ultimately successful.
- 12.2.12 To note as background, the SPD set out a baseline summary of the ecological survey work undertaken that informed the production of the SPD at that time. The document confirmed that proposals would need to be informed by further survey work and an ecological impact assessment that includes a management strategy. Since 2012, there has been monitoring of conditions on site, and a comprehensive re-survey set out in this report with the associated impact assessment and management strategy.
- 12.2.13 The SPD included provision for creating opportunities for enhancing the ecological value of the site through the provision of a park around the site's perimeter. Other recommended deliverables included the integration of public open space and sustainable water management with ecological assets using green corridors as well as ecological benefits as part of a sustainable and green setting within the surrounding landscape.
- 12.2.14 Since the adoption of the SPD, the whole 616 acre site has been agreed by Government as an enterprise zone, a hybrid application for the Huntspill Energy Park has been consented.
- 12.2.15 The LPA has also consented a remediation programme, which has been fully completed up to November 2020, and signed off. This required site engineering and remediation works over extensive tranches of the site.
- 12.2.16 The current SLP incorporates the HEP hybrid planning consent, as a commitment and seeks to safeguard the land for the delivery of the link road. This consent is now in implementation with the link road being largely constructed and due for final completion in the Autumn 2021.
- 12.2.17 The HEP consent has a number of planning conditions including the need for a strategic landscape masterplan (condition 36) and strategic design principles (condition 29) which were informed by the council policy documents including the development plan and the SPD. These documents have been submitted to SDC and agreed, therefore discharged.
- 12.2.18 The Local Development Order proposal (approved July 2020) takes account of the local policy context and the changing national and local policy context, to take a more proactive approach to climate change and economic transformation, through a market led approach, focused on delivery of a smart campus on the enterprise zone site. The Design Guide with the LDO will take account of the new and emerging requirements and provide a link to the approved design principles and SPD where relevant and appropriate.
- 12.2.19 The Site forms a key component of the Spatial Vision for Sedgemoor, as set out within the SLP. Gravity is named as a key catalyst to enable Sedgemoor to realise its potential as a leading innovation centre that builds on the unique natural assets of Sedgemoor landscape. In order to deliver this vision Strategic Priority 5 has been developed to underpin the Local Plan approach, of which the Site is a key component.
- 12.2.20 Policy S1 refers to the presumption in favour of sustainable development and the approach states that policies and site allocations within the Local Plan have been guided by this principle.
- 12.2.21 Policy S5 relates to mitigating the causes and adapting to the effects of climate change. Objective of this policy set out that the natural environment should be safeguarded as part of any development and ensure that habitats and species have the ability to adapt to the effects of climate change.

- 12.2.22 The Proposed Development is included as a Major Infrastructure Project under policy MIP1 and as a Bridgewater Vision Project under policy B1. The SLP acknowledges that the Site is allocated for energy uses, has outline planning consent and that part of the plan has been implemented in delivering the new access road.
- 12.2.23 There are five policies in the SLP that relate to the site and nature conservation, Policies **D20-23** and **D29**. Policy **D20** is concerned with protection of biodiversity and habitats of nature conservation significance, as well as the protection of statutory designated sites. Policy **D21** relates to the protection of ecological networks, such as wetlands, grassland and woodland, whilst Policy **D22** refers specifically to the protection of trees and woodland. Policy **D23** refers to Bat Consultation Zones in relation to SACs and Policy **D29** relates to the protection and enhancement of existing green infrastructure.

Guidance

- 12.2.24 The evaluation and effect assessment method is based on the guidelines produced by the Chartered Institute of Ecology and Environmental Management (CIEEM), which avoids the provision of definitions as to how to assign habitats and species different levels of value and relies on an approach that involves professional judgement and the use of available guidance and information.
- 12.2.25 Technical guidance produced in relation to SAC for bats within Somerset have been reviewed. The guidance documents identify consultation zones to assist in understanding where it is necessary to consider potential effects on these sites, in order to avoid harm to the bat populations associated with the Bat SACs. The Bat SACs for which guidance has been produced are North Somerset and Mendip Bat SAC, Hestercombe House SAC and Exmoor and Quantocks SAC. For clarity, the Site falls outside of the Bat Consultation Zones for each of these SACs.

12.3 Consultation

- 12.3.1 Consultation with relevant authorities and stakeholders in relation to the LDO has to date taken place in the form of regular (monthly) LDO Delivery Group meetings. Consultees include a representative of SDC, the Area Manager for Somerset, Avon and Wiltshire at Natural England and the Environment, Planning and Engagement Manager for Southwest at the Environment Agency.
- 12.3.2 In tandem with the LDO Delivery Group meetings, regular Environment sub-Group meetings have taken place. These have been attended by relevant stakeholders to discuss aspects of the project relevant to ecology, hydrology and landscaping.
- 12.3.3 Meetings have also been held directly with representatives of Natural England and the Environment Agency with regard to specific issues relevant to ecology including nutrient neutrality and protected species licencing.

12.4 Methodology

Study Area

- 12.4.1 The ecological study area is primarily defined as the areas contained within the LDO boundary. Consideration has also been given to areas outside of the LDO boundary, for example in light of the hydrological links between the Site and designated sites in the wider area, including those described below at **paragraph 12.6.16**, consideration has been given to the potential for adverse effects to arise at these sites from the Proposed Development. Furthermore, consideration has been given to areas adjacent to the Site, including ponds up to 500m from the Site boundary that may support breeding Great Crested Newt (GCN) *Triturus cristatus* and potential Badger *Meles meles* setts located within 30m from the Site boundary. In undertaking this assessment, regard has been had to the historic

understanding of the Site ecology, which includes baseline information gathered over a period in excess of ten years.

Baseline Data Collection

- 12.4.2 The majority of the Site has been the subject of extensive ecological surveys since 2008. EnvironPlus International Limited (EPI) undertook an initial suite of surveys in 2008, with Ecology Solutions having undertaken regular update work since 2011. Survey and assessment works are detailed in the ecology chapters of the 2013 ES and 2017 ES Addendum produced by Ecology Solutions in support of the 2017 Planning Consent.
- 12.4.3 The ecological information collected at the Site, or parts thereof, has been used to inform the decommissioning and remediation works that have been undertaken onsite. This has involved the submission of Natural England licence applications for roosting bats, GCN, Water Vole *Arvicola amphibius* and Badgers. The surveys have also informed general site maintenance and habitat management.
- 12.4.4 Ecology Solutions was further commissioned on behalf of Gravity in March 2020 to undertake a comprehensive programme of ecology surveys at the Site. Furthermore, specific survey and monitoring work has been undertaken in 2021 in relation to species such as bats and Badgers as well as habitat management. This survey information is considered as the basis for the current state of the environment. It should be noted that this survey work was undertaken with regard to the wider LDO Development boundary.
- 12.4.5 The methodology utilised for the survey work undertaken can be split into three areas, namely desk study, habitat survey, and faunal surveys. These are discussed in more detail within the baseline survey reports included at **Appendix 12.1 to 12.9** to this ES Chapter.
- 12.4.6 This chapter assesses the LDO Development against the future baseline scenario where the 2017 Planning Consent has been delivered. This 2032 baseline includes the approved development anticipated to come forward incorporating any further ecological mitigation required as part of the 2017 Planning Consent. As set out above, the historic and current state of the environment is well understood. However, it is important to note that the 2032 Baseline will be different from the Current State of the Environment of the Site. These differences are considered further below.

Habitats within the 2032 Baseline

- 12.4.7 The habitats that form the 2032 baseline will represent those delivered as part of the 2017 Planning Consent. This will include all landscape features and drainage features as well as habitat creation within the ecological mitigation measures. The time required to establish these habitats has been considered as part of the 2032 Baseline, as some habitats / features can be established relatively quickly (i.e. grasslands) compared to others (i.e. mature trees).
- 12.4.8 It is important to note that the Site boundary represents a greater area of land compared to the boundary of the 2017 Planning Consent. As such, the LDO boundary contains areas that fall outside of the 2017 Planning Consent. Where areas fall outside of the 2017 Planning Consent, but within the Site, they are considered to be unchanged from their current state (as described within the 2020 survey work), except where reasonable changes can be predicted. As part of this, it is assumed that current land uses and management (e.g., farming practices such as cattle grazing) would continue.

Faunal Species within the 2032 Baseline

- 12.4.9 As with the 2032 Baseline for habitats, the use of the Site by faunal species within the 2032 Baseline takes account of all the mitigation measures set out within the 2017 Planning Consent. Again, the baseline takes account of the difference between the 2017 Planning Consent boundary and the Site, where relevant.

- 12.4.10 As set out above in relation to works completed to date, a significant proportion of mitigation work related to protected species has been completed as part of the demolition and remediation within the ROF fence. This work and all other species-specific mitigation measures that are to be delivered as part of the 2017 Planning Consent are considered as part of the 2032 Baseline.

Designated Sites within the 2032 Baseline

- 12.4.11 The statutory and non-statutory designated sites and their relationship within the Site are described below with consideration given to the 2032 Baseline scenario.
- 12.4.12 The nearest statutory designated site is the Huntspill River National Nature Reserve (NNR), which is located immediately to the north of the Site, with a small section (c.0.7ha of a total 148.98ha) within the Site boundary itself. The 2017 Planning Consent concluded that the area within the Site that falls within the Huntspill River NNR would not be adversely affected. Indeed, ecological enhancements are to be delivered and are reflected within the 2032 Baseline.
- 12.4.13 The assessments for the 2017 Planning Consent did not identify any significant effects on any Sites of Special Scientific Interest (SSSI), SACs, SPAs and Ramsar Sites .
- 12.4.14 There are ten non-statutory designated Local Wildlife Sites (LWS) within or adjacent to the Site. Assessments for the 2017 Planning Consent identified that, impacts arise on several of these sites in the form of land take and/or changes to habitat type, some of which have been implemented as part of the remediation of the Site. In addition, ecological mitigation and enhancement measures are to be delivered at several of these sites. The 2032 Baseline will include the full implementation of these measures.
- 12.4.15 In considering the timeframe of the 2032 Baseline, it is anticipated that the LWSs onsite will be subject to review as part of the LDO and by the Local Wildlife Sites Panel over this period and changes that have arisen as part of the 2017 Consent will be reflected with revised LWS boundaries and/or qualifying features. The landowner will be expected to be consulted on this process
- 12.4.16 Where parts of LWSs are proposed to be affected or impacted by the development, it can be expected that these parts will be considered and integrated within the design code for the enterprise zone site. Where changes to habitat types or quality are delivered these will be reflected within revised citations. The 2032 Baseline will take account of these anticipated changes where appropriate.

Sensitive Receptors

- 12.4.17 Sensitive receptors are considered to be those that have been identified as ecologically important features. These consist of statutory and non-statutory designated sites within the Site, connected to the Site or in proximity to the Site, habitats within the Site and species that utilise the Site.
- 12.4.18 •Consideration is given to the following sensitive receptors:
- Statutory designated sites
- Somerset Levels and Moors SPA / Ramsar, Severn Estuary SPA / SAC / Ramsar, Mendip Woodlands SAC, Mendip Limestone Grasslands SAC, Bat SACs (North Somerset and Mendip Bat SAC, Hestercombe House SAC and Exmoor and Quantocks SAC) and Huntspill River NNR. This includes any unpinning designations such as SSSIs (as appropriate). It should be noted that the Habitats Regulations Assessment has proceeded on a precautionary basis, with screening being undertaken based upon a 20km radius from the Site.

- Non-statutory designated sites

Puriton Rhyne and Ponds Local Wildlife Site (LWS), Borrow Pit LWS, Stoning Pound Field and Rhyne LWS, Woolavington Road and Fields North LWS, Puriton Cowslip Field LWS, Puriton Ash Ground LWS, Northmead Drove Fields LWS, Puriton Meadows and Rail Spur LWS, New Ground Covert LWS, South Hills Wood LWS

- Habitats

Improved Grassland, Semi-Improved Grassland, Amenity Grassland, Marshy Grassland, Plantation Woodland, Orchard, Trees / Scrub, Hedgerows, Ephemeral / Short Perennial Vegetation, Standing Water, Reed Bed and Buildings and Hardstanding.

- Species

Bats, Badgers, breeding birds, reptiles, Water Vole, GCN and invertebrates.

Assessment of Significance

12.4.19 Identification and assessment of likely significant ecology effects of the proposed development uses the following well established models and standard procedures, alongside professional judgement.

12.4.20 The evaluation and impact assessment method is based on the guidelines produced by the Chartered Institute of Ecology and Environmental Management (CIEEM), which relies on an approach that involves professional judgement and the use of available guidance and information, rather than the provision of definitions to assign habitats and species different levels of value.

12.4.21 The value of each resource has been determined within a defined geographical context:

- International;
- National (England/Northern Ireland/Scotland/Wales);
- Regional (e.g. County);
- Local (within the District); or
- Within Zone of Influence (i.e. Neighbourhood) only.

12.4.22 A number of other key aspects require consideration when determining the value of any identified receptor. These include:

- Designated Sites and Features (e.g. SPA, SSSI, important hedgerows, etc.);
- Biodiversity Value (e.g. consideration of UK Priority Species and Habitats, Local Biodiversity Action Plan (BAP) targets, development plans and other published documents);
- Potential Value;
- Secondary or Supporting Value;
- Social or Economic Value; and
- Legal Issues.

- 12.4.23 For example, where local biodiversity action plans have not been adopted the Wild Somerset – The Somerset Biodiversity Strategy 2008 – 2018, has been used to assist in valuing features and developing mitigation strategies, where necessary. However as indicated this is now expired, though remains a source of local information regarding the biodiversity value associated with the area. Consideration has also been given to the Sedgemoor Local Plan.
- 12.4.24 Having identified the ecologically important features likely to be affected by the Proposed Development, the guidance promotes a transparent approach in which an impact is determined to be significant or not on the basis of a discussion of the factors that categorise it. This includes characterising the nature of the likely impacts on each important feature in terms of ecological structure and function, by considering the following parameters:
- Beneficial or adverse;
 - Extent;
 - Magnitude
 - Duration;
 - Reversibility; and
 - Timing and frequency.
- 12.4.25 Where it is concluded that there would be an impact (beneficial or adverse) on a defined site or ecosystem(s) or habitats or species within a given geographical area, it can often be further described as significant in the following terms; substantial, major, moderate, minor and negligible (no effect). However, given the subjective nature of these criteria, CIEEM consider that this approach should only be applied where consistency is required across chapters or where the specific subjective nature of the evaluation is explained. In order to maintain consistency across the Environmental Statement, when applying these criteria within this chapter, it has been necessary to make a clear distinction between evidence-based and value-based judgements to clarify the level of subjective evaluation that has been applied.
- 12.4.26 The assessment also gives specific consideration to the concept of biodiversity net gain. This process involves the quantitative comparison of the baseline situation with the proposed development. With the use of a relevant metric (e.g., the DEFRA metric) a biodiversity impact assessment can be undertaken, that both informs the design of proposed development and assists with quantifying the apparent loss or gain in biodiversity that will result from the proposed development.

Limitations

- 12.4.27 All of the species that occur in each habitat would not necessarily be detected during survey work carried out at any given time of the year, since different species are apparent at different seasons. However, given the habitats present and the level of historic and up to date survey work that has been conducted, it is considered that an accurate and robust assessment of the ecological value of the habitats present within the Site has been made. Therefore, it is considered that the survey information available forms a robust basis on which to undertake an ecological impact assessment.
- 12.4.28 Limitations exist with respect to predicting the 2032 Baseline scenario in relation to the type and condition of the habitats and species that are considered to be present at the Site. However, retained habitats are well understood, and the proposed habitat creation and enhancements proposed have regard to industry standards and follow recognised methodologies. Therefore, the condition of these habitats as part of the 2032 Baseline can be reasonably predicted.

- 12.4.29 Given the relatively short period of time, in ecological terms, over which changes need to be predicted it is considered highly unlikely that any new protected/notable species will colonise that in this time period. Equally, based on the mitigation measures prescribed as part of the 2017 Consent, it is considered that no protected/notable species will be lost to the Site over this period.

12.5 Baseline Conditions

Current State of the Environment

- 12.5.1 From an ecological perspective the Current State of the Environment is well understood as a comprehensive suite of survey work has been undertaken in 2020 with further specific survey / monitoring work undertaken in 2021. The majority of the Site has been subject to extensive land remediation and most recently, the removal of infrastructure below the surface of the Site which has resulted in large tracts of the Site be subject to active construction activity.
- 12.5.2 Habitat surveys were undertaken throughout 2020 to ascertain the general ecological value of the Site and to identify the main habitats and associated plant species.
- 12.5.3 The Site was surveyed based around extended Phase 1 survey methodology, as recommended by Natural England, whereby the habitat types present are identified and mapped, together with an assessment of the species composition of each habitat. This technique provides an inventory of the basic habitat types present and allows identification of areas of greater potential which require further survey. Any such areas identified can then be examined in more detail.
- 12.5.4 The following main habitat / vegetation types were identified on parts of the site:
- Improved Grassland;
 - Semi-Improved Grassland;
 - Amenity / Rough Grassland;
 - Marshy Grassland;
 - Plantation Woodland / Orchard;
 - Trees;
 - Scrub;
 - Hedgerows;
 - Tall Ruderal Vegetation;
 - Ephemeral / Short Perennial Vegetation;
 - Standing Water;
 - Reed Bed;
 - Bare Ground;
 - Seasonal Wet Ditches / Dry Ditches; and
 - Buildings and Hardstanding.

- 12.5.5 The vegetation present enabled the habitat types to be satisfactorily identified and an accurate assessment of the ecological interest of the habitats to be undertaken.
- 12.5.6 The habitats present and their current condition has been influenced by the part implementation of the 2012 Remediation Consent (planning reference: 42/11/00017) and the 2017 Planning Consent (planning reference 42/13/00010). Large areas of the Site have been subject to remediation works that have resulted in disturbance to habitats and features. Other areas have been safeguarded for habitat creation and enhancement.
- 12.5.7 General faunal activity observed during the course of the 2020 surveys was recorded, whether visually or by call (aurally). Specific attention was paid to the potential presence of any protected, rare, notable or Priority Species. In addition, specific surveys were undertaken for bats, Badgers, breeding birds, reptiles, Water Vole, GCN and invertebrates. Methodologies for the survey work employed have been developed with regards to recognised guidance and standards specific to each species / species group. These are detailed specifically with the survey reports included at **Appendix 12.2 to 12.9** of this ES Chapter.
- 12.5.8 The faunal survey results are summarised below. Detailed survey results are included within the survey reports included at **Appendix 12.2 to 12.9** of this ES Chapter.
- 12.5.9 Bat activity has been recorded across the Site, including a number of roost sites located within buildings within the south of the Site. Furthermore, bespoke bat roosts have also been created within the east of the Site as part of the licenced mitigation strategy related to the loss of onsite roosts as part of the site remediation. Species recorded include Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Nathusius' Pipistrelle *Pipistrellus nathusii*, Serotine *Eptesicus serotinus*, Brown Long-eared Bat *Plecotus auritus*, *Nyctalus* sp. and *Myotis* sp. In addition, rarer bat species have been recorded: Greater Horseshoe Bat *Rhinolophus ferrumequinum*, Lesser Horseshoe *Rhinolophus hipposideros* and Barbastelle *Barbastella barbastellus*.
- 12.5.10 Evidence of Badgers using the Site has been consistently recorded, including several setts, one of which is an artificial sett created as part of a licenced sett closure. That artificial sett is currently not in use; however a new sett has been created in close proximity and this is considered to be a main sett for the social group. Additional active setts of lesser significance are associated with the rail spur within the northwest of the Site.
- 12.5.11 A variety of bird species have been recorded utilising the Site. In total 47 species were recorded during the 2020 surveys with 28 of these species showing signs of breeding including singing, nest construction and territory displays. A further three species were recorded that were likely to be breeding however no signs of this were recorded during the surveys. The survey identified a number of species listed on Schedule 1 of the Wildlife and Countryside Act, the UK and Somerset BAPs and/or on the Red and Amber Lists of Species of High Conservation Concern. Such species include Cetti's Warbler *Cettia cetti*, Marsh Harrier *Circus aeruginosus* and Kingfisher *Alcedo atthis*.
- 12.5.12 Grass Snake *Natrix helvetica* are present in relatively low numbers and have been principally recorded in locations in the north of the Site, in association with the reed bed / rhynes habitats.
- 12.5.13 The system of rhynes and reedbed onsite are known to hold a small yet dispersed population of Water Vole. American Mink *Neovison vison* are also known to be present onsite and in conjunction with poor habitat condition (which is commonplace) are considered to be contributing to the low numbers and dispersed nature of Water Vole. American Mink populations will be subject to control as part of any licenced Water Vole strategy.
- 12.5.14 Translocations of Great Crested Newts have been undertaken onsite. The central part of the Site was cleared of GCNs in 2017 as part of the onsite remediation process and a separate licenced exclusion was undertaken in 2014 within the southeast of the Site as part of

drainage works. As part of this process, receptor sites have been created within the northwest and southeast of the Site. Their presence has been confirmed within these receptor areas through update survey work in 2020. The reed bed and adjacent rhynes to the north of the Site were also sampled for eDNA in 2020 and returned negative results for the presence of this species. The central areas within the ROF fence are considered to be cleared of GCN.

- 12.5.15 Detailed update invertebrate surveys were completed in 2020 across the Site. Habitat assessments were completed in early 2020, with sample collection undertaken thereafter. Initial findings have noted a number of nationally scarce species, such as a Horsefly *Atylotus rusticus*, that are associated with habitat features within the Site.

Priority Habitats

- 12.5.16 Of the several habitats identified during survey work a number fulfil criteria for UK priority habitats. The following Priority habitats are identified on Natural England spatial datasets:
- Traditional Orchard;
 - Lowland Mixed Deciduous Woodland;
 - Coastal and Floodplain Grazing Marsh; and
 - Lowland Calcareous Grassland.
- 12.5.17 The distributions of these habitats are illustrated within **Appendix 12.1**.
- 12.5.18 Traditional Orchard is characterised by fruiting trees set within herbaceous vegetation. Trees are grown in low intensity for fruit or nut production rather than timber. Given the presence of fruiting trees and the lack of apparent intensive management it is considered that this Priority Habitat is present in the form of the orchard habitat.
- 12.5.19 Lowland Mix Deciduous Woodland include most semi-natural woodland in lowland England. The woods tend to be small and vary greatly in species composition and can include both primary and secondary woodland. Given the broad nature of the Priority Habitat description and the characteristics of the onsite woodlands, it is considered that this Prior Habitat is present onsite in the form of plantation woodland.
- 12.5.20 Coastal and Floodplain Grazing Marsh is defined as periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. The ditches are especially rich in plants and invertebrates. Almost all areas are grazed, and some are cut for hay or silage. Seasonal water-filled hollows and permanent ponds with emergent swamp communities, but not extensive areas of tall fen species like reeds. It is considered that this description fits with some areas of semi-improved grassland onsite, although the majority of the improved fields lack the presence of species rich rhynes or emergent swamp vegetation.
- 12.5.21 Lowland Calcareous Grassland is defined by the presence of calcareous plant communities with agricultural enclosures as well as other locations such as roadside verges. However, the small area identified within the Puriton Cowslip Field LWS is considered to support semi-improved neutral grassland and it is considered that this Priority Habitat is not present onsite.
- 12.5.22 The Natural England spatial datasets also identify areas of good quality semi-improved grassland (a Non-Priority Habitat) in association with the fields to the northwest of the Site. However, areas of semi-improved grassland at the Site may be classified under Lowland Meadow, which shares a crossover with good quality semi-improved grassland.
- 12.5.23 In addition to the above, other habitats within the Site that may fall within Priority Habitat descriptions include:

- Reed bed;
 - Ponds;
 - Hedgerows; and
 - Open Mosaic Habitats on Previously Developed Land (OMHPDL)
- 12.5.24 Reedbeds, as defined by UK BAP priority habitat descriptions, are wetlands dominated by stands of the Common Reed that maintain water for the majority of the year. Areas of open water, ditches, wet grassland and carr woodland may be associated with them. Areas of Reedbed were recorded, namely to the north of the Site.
- 12.5.25 Ponds, as defined within the UK BAP priority habitat descriptions, are seasonal standing water bodies up to 2 ha in size and which meet at least one of the following criteria:
- Pond habitat is of international importance;
 - Is host to floral and faunal species of high conservation importance;
 - Exceptional assemblages of key biotic groups;
 - Ponds of high ecological quality; and
 - Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context.
- 12.5.26 Ponds of recognised for supporting Great Crested Newts (a species of high conservation importance) are considered to meet this criterion.
- 12.5.27 All hedgerows consisting predominantly (i.e. 80% or more cover) of at least one woody UK native species are covered by the Priority Habitat. On this basis the Priority Habitat is considered to be present onsite in the hedgerow sections containing native species.
- 12.5.28 To identify OMHPDL all the following criteria set out in the UK BAP priority habitat descriptions must be met. The area of open mosaic habitat is at least 0.25 ha in size.
- a) There must be a known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site. Extraneous materials/substrates such as industrial spoil may have been added.
 - b) The site contains some vegetation. This will comprise early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought).
 - c) The site contains unvegetated, loose bare substrate and pools may be present.
 - d) The site shows spatial variation, forming a mosaic of one or more of the early successional communities plus bare substrate, within 0.25ha.
- 12.5.29 By applying the above criteria, it is considered that some parts of the Site would qualify. This is considered to be limited to areas of sparsely vegetated ephemeral / short perennial vegetation present in the south west of the Site, in association with the Puriton Ash Grounds LWS. It is noted that given the Site has been subject to remediation and active construction works are taking place, other parts of the Site may superficially fit with this description. However, this is in large part related to the recent / continuing activities onsite pursuant to remediation and other site management works.

2032 Baseline

Designated Sites

Statutory sites

- 12.5.30 The nearest statutory designated site is the Huntspill River NNR, which is located immediately to the north of the Site, with a small section (c.0.7ha of a total 148.98ha) within the Site boundary itself. The Huntspill River NNR consists of open water, lowland grassland and small areas of woodland. It supports populations of Otter *Lutra lutra* and Barn Owl *Tyto alba*. It is also designated due to its supporting and connecting habitat between the Severn Estuary SPA and the Somerset Levels and Moors SPA. The 2017 Planning Consent concluded that the area within the Site that falls within the Huntspill River NNR would not be adversely affected. Indeed, ecological enhancements are to be delivered and will be reflected within the 2032 Baseline.
- 12.5.31 The enhancements proposed within the reed bed are to provide a greater depth of water for the reeds to grow in and prevent the establishment of more terrestrial species within it. This will be delivered as part of the drainage scheme for the 2017 Consent.
- 12.5.32 The reed bed will be managed with a cutting regime aimed at reducing the speed at which the reed bed becomes choked with mature reeds and reed detritus. This will be undertaken as part of a rotational program of reed cutting, where only sections of the reeds are cleared every 7-15 years. The reedbed will also need to be dug out at times to alleviate the build-up of sediment and prevent terrestrial species to establish. The current state of the environment would indicate that this is required in the short term, but it is otherwise expected that this will only be required very infrequently. As part of the 2032 Baseline, this management is considered to be initiated.
- 12.5.33 The next nearest statutory designated site is Bridgwater Bay SSSI which is situated approximately 2.2km to the west of the Site at its closest point. The SSSI forms part of the Severn Estuary SPA, SAC and Ramsar Site (approximately 2.2km to the west of the Site). This area is designated for its internationally important populations of wildfowl and waders, its coastal habitats and three annex II species of fish. Further detailed information regarding the qualifying interest features associated with the Severn Estuary SPA, SAC and Ramsar site is included within the sHRA at **Appendix 12.12**.
- 12.5.34 Catcott, Edington and Chilton Moors SSSI is situated 3.2km to the east of the Site. This SSSI forms part of the Somerset Levels and Moors SPA and Ramsar site. The Somerset Levels and Moors SPA and Ramsar site is designated for its important assemblages of wintering wildfowl and waders including four Annex I species. Further detailed information regarding the qualifying interest features associated with the Somerset Levels and Moors SPA / Ramsar site is included within the sHRA at **Appendix 12.12**.
- 12.5.35 Other relevant statutory sites considered include three Bat SACs known as North Somerset and Mendip Bat SAC (located approximately 16km northeast of the Site at its closest point), Hestercombe House SAC (approximately 14.7km southwest of the Site) and Exmoor and Quantocks SAC (approximately 14.3km west of the Site). In addition, Mendip Limestone Grasslands SAC is located approximately 13km northeast and Mendip Woodlands SAC is located approximately 15.2km northeast.
- 12.5.36 The 2017 Planning Consent is not considered to materially affect the current status of any of the above designated sites. Furthermore, given the level of protection afforded to such designations it can be expected that they will remain present and maintaining their favourable condition as part of the 2032 Baseline. A summary of the unit conditions for all SSSIs underpinning relevant European sites is included at **Appendix 12.10**.

Non-statutory Sites.

- 12.5.37 There are ten non-statutory designated sites within or adjacent to the Site. Assessment for the 2017 Planning Consent identified that impacts would arise on several of these sites in the form of land take and/or changes to habitat type, some of which have been implemented as part of the remediation of the Site. In addition, ecological mitigation and enhancement measures are to be delivered at several of these sites. The 2032 Baseline includes the full implementation of these measures. The retained LWSs will be considered and integrated into the LDO process and managed to enhance their biodiversity and retain their designating features where possible within the smart campus. The management regime for each LWS is informed by the habitats and features present within them although follows the general principles of initiating a long-term sensitive maintenance program. In some instances, habitat creation is also proposed, and these are detailed further below.
- 12.5.38 In the northeast corner of the Site lies Puriton Rhyne and Ponds LWS, which includes an area of reed bed that is present within the north of the Site and leads towards the Huntspill River. It is designated for its notable plant species within the rhynes and because it supports Otter and the nationally scarce Hairy Dragonfly *Brachytron pratense*. Under the 2017 Planning Consent, the majority of the LWS will be retained and enhanced, although areas to the south of the LWS would be lost to development. It is considered that these losses will reduce the overall extent of the LWS, although the areas containing qualifying features will remain and thus the LWS will remain as part of the 2032 Baseline.
- 12.5.39 Borrow Pit LWS is situated in the east of the Site. It is designated for its breeding population of Cetti's Warbler. This area will not be affected as part of the 2017 Planning Consent and will therefore remain as part of the 2032 Baseline.
- 12.5.40 Stoning Pound Field and Rhyne LWS is situated to the east of the Site and to the south of the Borrow Pit LWS. It is designated for its notable plant species and on account of it previously supporting Otter. The LWS only partially falls within the 2017 Planning Consent (but falls fully within the Site boundary) and the proposals include screen planting within areas of improved grassland. By 2032, it is considered that such planting will have matured but not to its full extent. Overall, it is considered that the LWS would remain unchanged in respect of its qualifying features and extent as part of the 2032 Baseline.
- 12.5.41 Woolavington Road and Fields North LWS is situated within the south of the Site. It is designated for the mire habitats that it supports. The LWS only partially falls within the 2017 Planning Consent and the proposals include woodland planting within this area. Sections of the approved village enhancement scheme will pass through this LWS and in order to avoid effects on the LWS a wooden boardwalk will be installed over wetland habitats. By 2032, it is considered that such planting will have matured but not to its full extent. Overall, it is considered that the LWS would remain, for the most part, unchanged in respect of its qualifying features and extent as part of the 2032 Baseline.
- 12.5.42 Puriton Cowslip Field LWS is situated within the Site to the north of the Woolavington Road and Fields North LWS. It is designated for the grassland habitat and the plant species it supports. Under the 2017 Planning Consent, part of this LWS would be lost to development with other features enhanced. The areas to be lost are considered to be of limited value overall being at the periphery of the LWS boundary. The most notable feature is limited to an area of unimproved grassland within its centre that is retained and enhanced as part of the 2017 Planning Consent. The extent of the LWS will be reduced within the 2032 Baseline although the qualifying features are considered to remain.
- 12.5.43 Puriton Ash Ground LWS is situated within the western part of the Site and is designated for notable plant species that it supports. It is a species rich re-colonising waste ground with areas of scrub. The area was used as a tip for rubble and ash associated with the ROF. This has provided a basic nutrient poor substrate that has allowed the plant species to establish at a reduced rate. Part of the LWS has been capped under a landscape feature as part of remediation works. Within the 2032 baseline the LWS will remain, and the landscape mound

will have established a meadow grassland with areas of scrub and woodland planting that will be maturing. In light of the establishment of the grassland and scrub management, it is considered that the ecological value of this LWS will have increased from the current state of the environment.

- 12.5.44 Northmead Drove Fields LWS is situated within the northwest of the Site. It is designated for its mosaic habitats of grassland and rhynes. This LWS falls outside the 2017 Planning Consent boundary and is therefore considered to remain unchanged as part of the 2032 Baseline.
- 12.5.45 Puriton Meadows and Rail Spur LWS is situated within the northwest of the Site and then continues along the railway spur to the northwest outside of the ROF Site where it bisects the Northmead Drove Fields LWS. It is designated for the notable species that it supports and an area of semi natural grassland. Given that this LWS includes the rail spur, it falls within safeguarded land associated with the reinstatement of the rail connection, and no changes are considered to arise as part of the 2017 Planning Consent on the 2032 Baseline.
- 12.5.46 New Ground Covert LWS is situated outside of the Site boundary, to the south of the route of the Gravity Link Road that will be operational as part of the 2032 Baseline. It is designated for the ancient semi-natural broadleaved woodland habitat that it supports. However, the woodland is not classified as ancient woodland under the ancient woodland inventory. The LWS is considered to remain unchanged in relation to the 2032 Baseline.
- 12.5.47 South Hills Wood LWS is situated outside of the Site boundary, to the south-west of the route of the Gravity Link Road. It is designated for the ancient semi-natural broadleaved woodland and species rich grasslands that it supports. However, the woodland is not classified as ancient woodland under the ancient woodland inventory. The LWS is considered to remain unchanged in relation to the 2032 Baseline.

Habitats

- 12.5.48 The habitats present within the 2032 Baseline have been defined with consideration of the proposed habitat retention, losses, creation and enhancements that result from the implementation of the 2017 Planning Consent. Consideration has been given to the likely condition and maturation of such habitats and features with respect to the time it will take them to establish (e.g., woodlands and trees will mature more slowly than grasslands). Further consideration has been given to the expected habitat management strategies employed.
- 12.5.49 The following main habitat / vegetation types were identified:
- Improved Grassland;
 - Semi-Improved Grassland;
 - Amenity Grassland / Planting;
 - Marshy Grassland;
 - Plantation Woodland
 - Orchard;
 - Trees and Scrub;
 - Hedgerows;
 - Ephemeral / Short Perennial Vegetation;

- Standing Water;
- Reed Bed; and
- Buildings and Hardstanding.

12.5.50 The extent and condition of these habitats in the context 2032 Baseline is considered further below.

Improved Grassland

12.5.51 Improved grassland is present in fields at the peripheries of the Site boundary including the fields in the south and northwest of the Site. These fields fall outside the 2017 Planning Consent boundary and are cattle, sheep or horse grazed pastures. This reflects the main land use of the wider landscape within which the Site is located. This habitat is typically intensively managed, either as grazing or as a combination of grazing and forage harvesting. It is expected that this management regime will continue as part of the 2032 Baseline. The implementation of the approved village enhancement scheme will result in the loss of improved grassland, these losses will be realised as part of the 2032 Baseline.

Semi-Improved Grassland

12.5.52 As part of the 2017 Planning Consent mitigation strategy areas of semi-improved grassland are to be retained and enhanced or created within the retained elements of the LWSs present within the Site. This includes the landscape features to the west, the unimproved grassland within the Puriton Cowslip Field LWS, the meadow grassland associated with the rail spur and the grassland within the Puriton Rhynes and Ponds LWS. Some of these enhancement measures are already in place within the Current State of the Environment and will have matured as part of the 2032 Baseline.

12.5.53 Areas of safeguarded land associated with energy production will be treated as managed grasslands as part of the 2017 Planning Consent. As reflected within the Current State of the Environment, it is considered that the grasslands in these areas will be a species poor semi improved grassland subject to regular management as part of the 2032 Baseline.

12.5.54 Path side verges along the approved village enhancements scheme will deliver new areas of species rich grassland that will be considered to have matured as part of the 2032 Baseline.

Amenity Grassland / Planting

12.5.55 The 2017 Planning Consent included the creation or maintenance of areas of more formal planting, the design of which is informed by the Design Guide. These habitats will be created and well managed as part of the 2032 Baseline. The implementation of the approved village enhancement scheme will result in the loss of amenity grassland, these losses will be realised as part of the 2032 Baseline.

Marshy Grassland

12.5.56 The most extensive area of this habitat is present to the north and west of the 37 Club. The majority of this falls outside the 2017 Planning Consent boundary. An area of marshy grassland was also created as part of the GCN mitigation area in the northwest of the Site. This is already well established as part of the Current State of the Environment. Further marshy grassland is to be created in association with the northern section of the Gravity Link Road, which will be included in the 2032 Baseline. Furthermore, the implementation of the approved village enhancement scheme will pass through areas of marshy grassland, over which sections of wooden boardwalks will be installed, these changes will be included as part of the 2032 Baseline.

Plantation Woodland

- 12.5.57 There are discrete blocks of plantation woodland present throughout the Site, with larger areas present in the northwest and southeast and smaller isolated blocks scattered elsewhere within the Site. Given the nature of the plantation, the woodlands lack structural, age and species diversity.
- 12.5.58 As part of the Current State of the Environment the woodlands are present and subject to management to improve their condition. All woodland is considered to be retained as part of the 2032 Baseline.
- 12.5.59 New areas of woodland planting will be delivered as part of the 2017 Planning Consent, which will not be in a mature condition as part of the 2032 Baseline.

Orchard

- 12.5.60 Remnant orchard is located in the east and southeast of the Site. These areas contain relatively few orchard trees (*Malus* sp.) being dominated in large part by a mix of scrub, tall ruderal, and semi-improved grassland. These orchards fall outside the 2017 Planning Consent boundary and no enhancement or management is considered to take place as part of the 2032 Baseline, aside from grassland mowing. The condition of the orchard trees as part of the Current State of the Environment is generally poor and considered to continue to decline.

Trees and Scrub

- 12.5.61 Outside of the woodland, orchard and hedgerow treelines, there are relatively few mature trees within the Site. Within the ROF site and along the approach roads, there are tree lined avenues consisting primarily of Horse Chestnut *Aesculus hippocastanum* that are to be retained.
- 12.5.62 New tree planting is also to take place as part of the 2017 Planning Consent within plots as part of the amenity areas and as structure / screening planting. This will not be considered to be mature as part of the 2032 Baseline.
- 12.5.63 Whilst extensive scrub is present as part of the Current State of the Environment, this will be significantly reduced and controlled as part of the 2017 Planning Consent.
- 12.5.64 The railway corridor to the north-west of the Site has also been subject to extensive encroachment by scrub. As this is safeguarded land, the scrub is considered to remain present and continue to encroach on the railway as part of the 2032 Baseline.
- 12.5.65 The implementation of the approved village enhancement scheme will result in the loss of trees and scrub, these losses will be realised as part of the 2032 Baseline.

Hedgerows

- 12.5.66 As part of the 2017 Planning Consent hedgerows will be reduced within the Site, with sections retained in the northeast and northwest and new hedgerow planted as boundary features. Any new sections of hedgerow will be considered as not fully mature as part of the 2032 Baseline.
- 12.5.67 Areas outside of the 2017 Planning Consent boundary but within the Site boundary, namely in the south of the Site, contain additional hedgerow habitat. Given the type of habitat and their typical management, it is considered that these will remain unchanged from the Current State of the Environment in the 2032 Baseline.

- 12.5.68 However, construction activity related to the Hinkley Point C Connection Project in the southeast of the Site has required the removal of several hedgerows along the corridor of the connection route. Where any replanting is required, these sections will be considered to be immature.
- 12.5.69 The implementation of the approved village enhancement scheme will result in the removal of short lengths of hedgerow and creation and widening of gaps in hedgerows to facilitate the access route adjacent to Woolavington Road. By way of mitigation new hedgerow planting will be provided in adjacent areas that will be considered to be immature. These changes will be included as part of the 2032 Baseline.

Ephemeral / Short Perennial Vegetation

- 12.5.70 As part of the 2017 Planning Consent the Puriton Ash Grounds LWS will be retained in part, with elements of ephemeral / short perennial vegetation present. The LWS will be managed to maintain the conditions that allow this vegetation type to persist. This habitat type is considered to be limited to this area within the 2032 Baseline.

Standing Water

- 12.5.71 The most prominent water feature is the Borrow Pit located in the east of the Site. The fishing ponds are not subject to any change as part of the 2017 Planning Consent and are subject to management as part of the angling club's usage of the Site. The condition of the Borrow Pit is considered to remain unchanged as part of the 2032 Baseline.
- 12.5.72 A number of small seasonal ponds are located to the south east of the Site associated with grasslands, hedgerows and orchard that fall outside the 2017 Planning Consent boundary. As such, their condition is considered to remain unchanged as part of the 2032 Baseline.
- 12.5.73 Four ponds (designed to deliver six waterbodies overall, in periods when water levels drop) have been created in the northwest of the Site as part of the GCN mitigation area. These ponds have become well established and are considered to be in good condition. As such, their condition is considered to remain unchanged as part of the 2032 Baseline.
- 12.5.74 New SuDS features and ponds are included within the 2017 Planning Consent, including within the northern section of the Gravity Link Road. This feature will be considered to be fully installed as part of the 2032 Baseline.
- 12.5.75 Significant proportions of the rhyme network will be disturbed or lost as part of the 2017 Planning Consent with on-plot rhynes provided as necessary as informed by the Design Guide, although the areas of greater value including the permanent rhyme to the northeast of the Site will be retained and enhanced. The rhyme system will be considered to be fully implemented as part of the 2032 Baseline, although the areas of value will be considered to remain as highlighted within the Current State of the Environment. It should be noted that this does not apply to areas of safeguarded land.

Reed Bed

- 12.5.76 A substantial corridor of reed bed is present to the north of the Site which connects to the River Huntspill to the north. A specific management plan has been developed to enhance the area as part of the 2017 Planning Consent (see above in relation to the Puriton Rhynes and Ponds LWS). The 2032 Baseline will consider that this management has been implemented and is ongoing.
- 12.5.77 The invasive species Himalayan Balsam *Impatiens glandulifera* has been recorded within smaller areas of reed bed present associated with the fishing ponds within the Borrow Pit to the east of the Site. The species is to be controlled, with the aim of eradicating it from the Site, although it may recolonise the Borrow Pit or other wetland features at any time and will therefore require continued monitoring.

Buildings and Hardstanding

- 12.5.78 Buildings associated with the 2017 Planning Consent will be considered to be in good condition as part of the 2032 Baseline. Any retained buildings that remain in use (e.g. the 37 Club) will be considered to be maintained in the current condition.
- 12.5.79 Areas of hardstanding associated with roads, access and parking will be considered to be in well maintained condition as part of the 2032 Baseline.

Priority Habitats within the 2032 Baseline

- 12.5.80 Several priority habitats are present within the Site as part of the Current State of the Environment. Each of them are discussed below with respect of the 2032 Baseline.
- 12.5.81 Areas of Traditional Orchard are located outside of the 2017 Consent boundary and will not be directly affected. Although as noted above the orchards are in poor condition and this deterioration is considered to continue as part of the 2032 Baseline
- 12.5.82 Lowland Mix Deciduous Woodland in the form of plantation woodland will be retained. New woodland planting is also proposed, although it would not be fully mature as part of the 2032 Baseline.
- 12.5.83 Coastal and Floodplain Grazing Marsh is present in some areas of semi-improved grassland onsite. Furthermore, the majority of the Priority Habitat falls outside of the 2017 Consent boundary. Coastal and Floodplain Grazing Marsh will be retained as part of the 2032 Boundary within the northeast of the Site.
- 12.5.84 Good quality semi-improved grassland (a Non-Priority Habitat) is highlighted within the fields to the northwest of the Site. However, areas of semi-improved grassland at the Site may be classified under Lowland Meadow, which shares a crossover with good quality semi-improved grassland. These areas are retained as part of the 2032 Baseline.
- 12.5.85 Areas of Reedbed to the north of the Site will be retained as part of the 2032 Baseline.
- 12.5.86 Ponds that fit the criteria for this Priority Habitat will be retained as part of the 2032 Baseline.
- 12.5.87 Hedgerows will be, in the main, as part of the 2032 Baseline. Lengths will be lost in the central areas of the Site to facilitate the 2017 Consent. However, new hedgerow planting is also to be delivered at the Site boundaries and along internal roads and paths.
- 12.5.88 OMHPDL is considered to be limited to areas of sparsely vegetated ephemeral / short perennial vegetation within the Puriton Ash Grounds LWS. This habitat will be retained as part of the 2032 Baseline.

Fauna

- 12.5.89 Consideration is given below to the use of the Site by protected and notable species within the 2032 Baseline as informed by survey work detailing the Current State of Environment and the 2017 Planning Consent.

Bats

- 12.5.90 Bat roosts are present within the bat lofts created as part of the remediation consent, with evidence of use by Brown Long-eared bats having been recorded. Additional roosts are known to be present within the 37 club (Common Pipistrelle maternity roost) and the derelict dwelling on Woolavington Road (non-maternity Brown Long-eared bat roost) and within pill boxes to the south of the site. The 2017 Planning Consent retains these features, and they

are considered as active bat roosts within the 2032 Baseline. Further detail of roosting bats is included as **Appendix 12.3**.

- 12.5.91 In respect of the 2017 Planning Consent, the majority of the interest for commuting bats is limited to the periphery of the Site where navigational features such as hedgerow, woodland and rhynes are present. The 2017 Planning Consent sought to retain these areas as 'dark corridors'. The Internal part of the Site will be subject to greater levels of light spill and newly created amenity habitats and buildings are considered unlikely to be attractive to bats as part of the 2032 Baseline. The Site within the 2032 Baseline is considered to be utilised by the same species identified as part of the survey work that informs the Current State of the Environment.

Badger

- 12.5.92 The majority of Badger activity is associated with the railway spur as part of the Current State of the Environment. Indeed, setts (including the artificial sett) are present within this area and considered to remain as part of the 2032 Baseline. Habitats outside the railway spur offer navigating corridors throughout the Site, although the most suitable habitat for foraging and sett building is limited to the woodlands onsite. More central areas will be subject to increased lighting which will reduce its suitability to the species as part of the 2032 Baseline.

Birds

- 12.5.93 As recorded as part of the Current State of the Environment, the greatest interest for bird species onsite is the woodland, hedgerow, permanent rhynes and the reed bed. These are in the main, restricted to the periphery of the Site and as the 2017 Planning Consent seeks to retain these areas as 'dark corridors', they are considered as retained and enhanced features in the 2032 Baseline.
- 12.5.94 Barn Owl are considered to continue to remain present at the Site as part of the 2032 Baseline. Barn Owl boxes will be retained onsite and habitats such as long grasslands and hedgerow / tree lines will provide suitable foraging areas.
- 12.5.95 The Site within the 2032 Baseline is considered to be utilised by the same species identified as part of the survey work that informed the Current State of the Environment. Historic survey work has shown that the Site is of little interest to notable wintering bird species and is considered that the Site will not support a notable wintering bird population as part of the 2032 Baseline. With regard to breeding birds, the 2032 Baseline will retain areas of greatest value to the breeding population, including the reed bed, hedgerows and trees. As such, the 2032 Baseline is considered to support a similar assemblage of breeding birds as the Current State of the Environment.

Reptiles

- 12.5.96 Survey to inform the Current State of the Environment identified a small population of Grass Snake onsite, although their distribution is limited, and they were only recorded near to the reed bed in the north. As part of the 2017 Planning Consent, no specific mitigation for reptiles was considered necessary. The 2032 Baseline will consider that the populations and distribution of Grass Snake remains similar to the Current State of the Environment.

Water Vole

- 12.5.97 As part of the 2017 Planning Consent, Water Vole would be excluded from the parts of the Site subject to development and allowed to recolonise the Site once works were complete. Whilst some aspects of the rhyme network would be created to provide suitable habitat for the species, other sections (namely on plot ditches) would be less suitable.

- 12.5.98 As part of the 2032 Baseline, Water Vole are considered to be present within the Site within the retained and enhanced permanent rhynes.

Great Crested Newts

- 12.5.99 As part of the remediation works a GCN mitigation area was constructed within the northwest of the Site. The ponds created and associated habitats have been subject to management and are well established. As part of the 2032 Baseline, the area is considered to be in good condition for the species.
- 12.5.100 Other known GCN breeding ponds are located to the southeast of the Site (outside of the ROF fence). As part of the 2032 Baseline, they will also be considered to hold GCN.
- 12.5.101 Habitats within the plots of the 2017 Planning Consent are unlikely to be suitable for this species and it is unlikely that the populations will have colonised other parts of the Site within the time spans of the 2032 Baseline.

Invertebrates

- 12.5.102 As part of the 2017 Planning Consent, habitats of value to terrestrial and aquatic Invertebrates recorded onsite as part of the Current State of the Environment are largely retained and enhanced. These habitats being the reed bed, rhynes, orchard and nectar rich wildflowers associated with the more species rich grassland onsite. As part of the 2032 Baseline, these habitats are considered to remain as offering the most suitable habitat for the invertebrate population with the development, amenity areas and managed grasslands being of lesser value.

Other Species

- 12.5.103 It is noted that Otter are referenced as features for the Huntspill River NNR and other LWSs within the Site. However, the specific EPI survey work of 2008 / 2009 recorded no presence of Otter. During detailed survey work undertaken of potentially suitable habitat including the rhynes, reed bed, fishing ponds and areas of dense scrub over many years since, no evidence of Otter has been recorded onsite. Potential holt building habitat is very limited onsite, considered to be limited to the very north of the reed bed near the Huntspill River NNR and this will be unaffected by the 2017 Consent. Survey work in this area as part of the 2020 re-survey did not show any use by Otters. This species is not considered to be currently present at the Site.
- 12.5.104 Invasive American Mink are known to be present within the Site. This species will be controlled as part of the licenced Water Vole mitigation strategy. However, as they are likely present in the wider area it is considered that individuals will continue to access the Site as part of the future baseline where suitable habitat is available, in the absence of any sustained control.
- 12.5.105 As part of the survey work for GCN and the translocation works undertaken at the Site in respect of GCN other amphibian species have been recorded. These include Smooth Newt *Lissotriton vulgaris*, Common Frog *Rana temporaria* and Common Toad *Bufo bufo*. The habitats within the development plots associated with the 2017 Planning Consent are unlikely to be suitable for these species although they may remain present within suitable aquatic / terrestrial habitat (e.g. ponds and the reed bed) retained as part of the 2032 Baseline.

Consideration of Approved Developments

- 12.5.106 Approved developments and sites allocated in the Sedgemoor Local Plan 2011-2032 with the potential to give rise to significant cumulative effects have been identified in the wider area surrounding the Site. The EMMS in close proximity to the Site are limited to residential development that generally include their own elements of public open space including blue

and green infrastructure. None of which are positioned in very close proximity to the proposed open space within the Site and therefore any 'edge effects' associated with these developments will be of negligible significance. Furthermore, they are not considered to inhibit the aims of the enhancements or any species-specific mitigation to be delivered as part of the Proposed Development.

Biodiversity Net Gain

- 12.5.107 To further inform this impact assessment a Biodiversity Impact Assessment (BIA) has been undertaken that identifies and evaluates the potential effects the Development proposals may have on ecology. The process involves the use of a metric as a proxy for recognising the negative impacts on habitats arising from a development and calculating how much new or restored habitat, and of what types is required to deliver sufficient net gain. The metric approach provides a useful guide to demonstrate, on a quantitative basis, whether a net gain in biodiversity can be achieved. The approach involves comparing the baseline scenario to that of the proposed Development.
- 12.5.108 It should be noted that the BIA metric (DEFRA 3.0) shows that the Development will result in a loss of -62.97% habitat units, -32.83% hedgerow units and -32.16% river units. The full calculations are shown at **Appendix 12.11**. It is also important to note that the BIA metric used does not account for other forms of mitigation beyond those related to habitats. As such, other ecological betterments such as the provision of bat roost sites (e.g. bat boxes or lofts), log piles / hibernacula and bird boxes are not accounted for within the metric and therefore need to be considered in addition to the demonstrated net gain. The results of the BIA metric has been used to inform the quantum and type of habitat mitigation required to ensure a 10% net gain can be achieved through an appropriate offsetting scheme.

12.6 Embedded Mitigation

Demolition and Construction Phase

- 12.6.1 A Framework Demolition and Construction Environmental Management Plan (FDCEMP) is provided with this ES at **Appendix 4.1**. The aims of the plan are to avoid adverse effects on retained features onsite during the demolition and construction phase. This includes pollution prevention of aquatic and terrestrial habitats, prevention of encroachment of construction works onto retained habitat of value (including designated sites) and the control of noise and light disturbance on retained features such as badger setts or bat roosts. This is secured through the Compliance Form.

Landscape Strategy and Design

- 12.6.2 The landscape strategy is considered to be inherent to the scheme design and the provision of structural and screening planting, as well as the overall provision of open space. Ecological mitigation is directly linked to the landscape proposals, set out in the Design Guide. The provision of soft landscaping across the Site serves a dual purpose as the proposed planting will directly affect the floral diversity within the Site (with the planting or seeding of areas). Planting will provide foraging and sheltering resources as well as linking corridors in and around the Site for species to utilise. This will help mitigate for losses of, and impacts to, retained habitats and features that support protected / notable species.
- 12.6.3 The strategic landscape parameters plan included at **Appendix 3.1f** shows the extent of open space that is proposed as part of the LDO Development.
- 12.6.4 This includes green space that will feature areas of wildflower grassland and shrub / tree planting of native origins. The green space will provide opportunities to mitigate for losses to existing grasslands and losses of scrub and woodland.

- 12.6.5 Landscape corridors that include lines of trees and rhynes will provide links through the Site for use by faunal species as well as provide opportunities to deliver new / replacement habitat of ecological value.
- 12.6.6 The indicative extents of structural and woodland planting are also shown that will provide foraging and sheltering opportunities for a range of species.
- 12.6.7 This green space will also serve as amenity space for recreational use and as such will also include areas of short grassland and more regularly managed areas that will form part of a larger matrix of connected habitats. In addition to being of ecological value as part of an overall habitat matrix, areas where amenity use is a key objective are key components of the mitigation / avoidance strategy associated with the nearby Severn Estuary SPA / Ramsar (and SAC). New housing associated with the proposals could lead to an increased level of recreational pressure at the Severn Estuary SPA / Ramsar in the absence of mitigation. The delivery of good quality, accessible recreation / amenity space on the door step of any new residents (and workers) will help to avoid residents (and workers) seeking such opportunities at more sensitive locations, such as the Severn Estuary SPA / Ramsar. Further detail is presented in the sHRA at [Appendix 12.12](#).
- 12.6.8 Overall, the strategic landscape parameters plan shows that broad areas of land are available at the Site's periphery that can be utilised to deliver a diverse and interconnected matrix of habitat types of ecological value.
- 12.6.9 The southwestern corner of the Site provides a mix of aquatic and terrestrial habitat that connects across the frontage of the Site with landscaped tree lines and rhynes as well as wider areas of open space that can serve as stepping-stones through the corridor. These connect again into the Gravity Park that will include retained orchards, hedgerows, and grasslands all of which can be subject to ecological betterment.
- 12.6.10 Along the eastern boundary of the Site, structural tree and woodland planting will be established that will provide sheltered connections through the Site for species in a north-south direction. Structural tree planting provides screening from surrounding areas as well as delivering commuting routes, foraging resources and places of refuge and shelter of value to a range of faunal species / groups.
- 12.6.11 Eastern boundary planting connects with the retained fishing ponds to the east of the Site and further north and west, to the mix of grasslands, trees and scrub, rhynes and water attenuation features that provides a significant opportunity to deliver biodiversity betterment. The northern boundary of the Site provides a strong ecological link in an east-west direction, providing commuting routes as well as sheltering and foraging areas for a range of species. Furthermore, the northern part of the Site provides a link through the retained reedbed and rhynes system to the Huntspill NNR and wider landscape. The western boundary adds further diversity to the matrix of habitats which can be delivered, with areas of woodland, scrub, grasslands, and ephemeral habitats (associated with the rail infrastructure and landscape mound, with a connection to the mix of aquatic and terrestrial habitat in the southwest of the Site.

Surface Water Management Strategy

- 12.6.12 Similarly, the surface water management strategy is closely linked to ecological mitigation requirements. The existing aquatic features within the Site (e.g. rhynes) are considered to be of ecological value, supporting a range of faunal species.
- 12.6.13 New open drainage infrastructure will be designed to support a vegetation structure and species complement which will be of ecological value.
- 12.6.14 The surface water management strategy will also allow for the monitoring of water levels to ensure that fluctuations in water levels remain within acceptable limits, an important factor for many species where flooding and drying are detrimental to long term population viability.

Lighting and Noise

- 12.6.15 Mitigation relating to lighting is also of relevance to the required ecological mitigation. Light can affect the behaviour of protected / notable species such as bats and to an extent Badgers and birds. Mitigation that reduces unnecessary light spill and focuses lighting to where it is needed for security and safety reasons will also reduce potential disturbance impacts on species using the Site.
- 12.6.16 Regarding noise, whilst any measures to limit increased noise levels are to be viewed positively, given the specific mitigation strategies detailed in subsequent sections, the distances involved in relation to nearby statutory designated sites and the level of habituation which would be expected occur in relation to birds, for example, noise effects (insofar as ecological receptors are concerned) are not considered to be significant.

12.7 Assessment of Likely Effects

- 12.7.1 This section identifies the likely significant effects of the Proposed Development, both during demolition / construction and operation, such that any further mitigation can be identified where necessary. To avoid repetition the demolition / construction and operation effects are considered together by receptor.

The Principles of Site Evaluation

- 12.7.2 The methods and standards for site evaluation within the British Isles are defined in 'A Nature Conservation Review' by Ratcliffe (1977). These are broadly used across the United Kingdom to rank sites, so that priorities for nature conservation can be ascertained. The current SSSI designation maintains a system of data analysis which is roughly tested against Ratcliffe's criteria.
- 12.7.3 In general terms, these criteria are identified as size, diversity, naturalness, rarity and fragility.
- 12.7.4 Additional secondary criteria includes: typicalness, potential value, intrinsic appeal, recorded history and the position within ecological/geographical units are also incorporated into the ranking procedure.
- 12.7.5 Any assessment should not judge sites in isolation from others since several habitats may combine to make it worthy of importance to nature conservation.
- 12.7.6 Furthermore, relying on the national criteria would undoubtedly distort the local variation in assessment and, therefore, additional factors need to be taken into account (e.g., a woodland type with comparatively poor species diversity, common in the south of England, may be of importance at its northern limits, say in the border county).
- 12.7.7 In addition, habitats of local importance are often highlighted within a local Biodiversity Action Plan (BAP). The Sedgemoor BAP highlights a number of habitats. Where these occur within the application site, they are highlighted below.
- 12.7.8 Levels of importance can be graded at the international, national, regional, county or local level and in terms of low, medium or high value.

Designated Sites

Statutory Designated Sites

- 12.7.9 There are no sites of international or national importance such as SPAs, SACs or SSSIs within the Site boundary. The statutory designated Huntspill River NNR is located in the north of the Site and a small section is included within the Site. It is notable as connecting

habitat of the Somerset Levels and Moors SPA/Ramsar and the Severn Estuary SPA/Ramsar.

- 12.7.10 In addition, Mendip Limestone Grasslands SAC is located approximately 13km northeast and Mendip Woodlands SAC is located approximately 15.2km northeast.
- 12.7.11 The Severn Estuary SPA/Ramsar is located approximately 2.2km at its nearest point to the west of the Site, and the Somerset Levels and Moors SPA/Ramsar is located approximately 3.2km to the east of the Site. The Severn Estuary is also designated as an SAC.
- 12.7.12 Other statutory sites considered include three Bat SACs known as North Somerset and Mendip Bat SAC (located approximately 16km northeast of the Site at its closest point), Hestercombe House SAC (approximately 14.7km southwest of the Site) and Exmoor and Quantocks SAC (approximately 14.3km west of the Site). In addition, Mendip Limestone Grasslands SAC is located approximately 13km northeast and Mendip Woodlands SAC is located approximately 15.2km northeast.
- 12.7.13 The Conservation of Habitats and Species Regulations 2017, referred to as the "Habitats Regulations" aim to protect a network of sites in the UK that have rare or important habitats and species in order to safeguard biodiversity.
- 12.7.14 In particular, the UK is required to designate the most suitable sites as SACs or SPAs. All such SACs and SPAs will form part of the National Sites Network under the Habitats Regulations.
- 12.7.15 Under the Habitats Regulations, competent authorities have a duty to ensure that all activities which they regulate have no adverse effect on the integrity of any of the European sites in the UK.
- 12.7.16 In this case, the proximity of the international designations has required consideration to be given to potential impacts on these European sites in line with the above legislative context.
- 12.7.17 As such a standalone shadow Habitats Regulation Assessment (sHRA) has been prepared in parallel with this Biodiversity ES Chapter that considers all of the relevant information in respect of the Proposed Development. This is included at **Appendix 12.12**.
- 12.7.18 Although part of the Huntspill River NNR lies within the Site this will not be directly affected by the Proposed Development through land take.

Demolition / Construction Phase

- 12.7.19 The area of the NNR within the Site will be retained as woodland and reedbed. At its nearest point the NNR is approximately 0.8km from any area where development is proposed. There is a minor risk that the NNR could be affected by dust deposition during the construction phase, however, as the majority of earth works have already been carried out as part of the consented remediation works this is not considered to be significant. Furthermore, embedded mitigation through the FDCEMP is in place as part of the construction phase to manage dust.
- 12.7.20 With reference to the sHRA at **Appendix 12.12**, no likely significant construction effects have been identified in relation to any of the relevant designated sites (including the underpinning SSSIs) and no specific mitigation is considered to be required.
- 12.7.21 Demolition / construction related effects on Statutory Designated Sites are considered to be of **negligible** significance.

Operational Phase

- 12.7.22 Given that areas where development is proposed are significantly distant from the nearest point of the NNR potentially significant effects are considered to be limited to those relating to hydrology. The drainage strategy associated with the proposals includes water attenuation, treatment of grey water (at a water treatment plant) and further polishing through the reedbed system, such that 'clean' water will be discharged into the Huntspill NNR. It is important to recognise that whilst the Site is in the surface water catchment for the Somerset Levels and Moors SPA / Ramsar, it has been demonstrated that the hydraulic regime is such that discharged water would not reach this designated site, providing a further comfort in relation to water quality issues (a cited issue for this SPA / Ramsar and SSSI).
- 12.7.23 It should also be noted that the Site already has an extant licence for the abstraction of water from the Huntspill River NNR. Should any changes to the required levels of abstraction be necessary in the future, this will be subject to a new licence application and any effects will be considered as part of the licencing process.
- 12.7.24 No additional mitigation is considered to be required in respect of the Huntspill NNR.
- 12.7.25 Noting the connection between the NNR and the Severn Estuary SPA / SAC / Ramsar and the Somerset Levels and Moors SPA / Ramsar, the above conclusions regarding hydrological matters are equally relevant in respect of these designated sites and the SSSIs which underpin them.
- 12.7.26 Insofar as other statutory designated sites are concerned, in undertaking a precautionary assessment, the sHRA has concluded that with the exception of recreational pressure on the Severn Estuary, all other relevant designated sites and impact pathways can be screened out at the first assessment stage (likely significant effect).
- 12.7.27 Regarding recreational pressure on the Severn Estuary, specific mitigation is put forward, such that the Competent Authority can be certain beyond all reasonable doubt that no adverse effect on integrity will arise.
- 12.7.28 Operation related effects on Statutory Designated Sites other than the Severn Estuary are considered to be of **negligible** significance.
- 12.7.29 Operation related effects on Statutory Designated Sites other than the Severn Estuary are considered to be of **negligible** significance
- 12.7.30 Operation related effects on the Severn Estuary SPA / SAC / Ramsar / SSSI are considered to be **indirect, permanent, adverse** at the **national to international** level and of **moderate** significance.

Non-Statutory Designated Sites

Demolition / Construction Phase

- 12.7.31 The site was approved as an enterprise zone in 2017 and the focus is now on delivery to create sustainable employment for communities. The proposed development of the enterprise zone will require the complete loss of Puriton Cowslip Field LWS and Woolavington Road and Fields North LWS. Whilst these LWS are to be lost, the features for which they are designated will be retained and integrated onsite as part of compensation measures secured through the design code.
- 12.7.32 Partial land take will occur on Puriton Rhyne and Ponds LWS, Stoning Pound Field and Rhyne LWS and Puriton Meadows and Rail Spur LWS. Subject to the proposed rail alignment and associated infrastructure, additional land take may arise on Puriton Meadows and Rail Spur LWS and Puriton Ash Ground LWS.

- 12.7.33 The areas of land take associated with the Puriton Rhyne and Ponds LWS contains no significant rhynes and is limited to areas of grassland and hedgerow. There will be a loss of part of the LWS due to the Proposed Development, but the part of the LWS that will be lost does not meet the qualifying criteria for the designation.
- 12.7.34 Land take associated with the Puriton Meadows and Rail Spur LWS occurs on the eastern edge of the LWS that consists of existing plantation woodland. The meadows themselves will be retained in part, subject to the details of reinstating the rail alignment. In the event that the meadows are lost completely to the rail alignment, this would result in a loss of one of the qualifying features for the LWS. However, as with other losses of LWS features, the habitat types for which they are designated will be retained elsewhere onsite with betterment delivered to these areas.
- 12.7.35 The rhynes within the Stoning Pound Field and Rhyne LWS will be largely unaffected by the land take on this LWS. The field would be lost; however this is of no significant ecological value.
- 12.7.36 The remaining part of the Puriton Ash Ground LWS (following remediation activities undertaken) will likely, be retained, although the extent of the retainment is subject to the details of reinstating the rail alignment. However, it should be noted that the rail alignment will most likely fall to the east of the LWS where previous remediation work has taken place. As such, the habitats present that may be lost or disturbed have only recently established.
- 12.7.37 Given the proximity of the LWSs to the built form, there is potential for indirect effects to arise, such as dust deposition, noise, lighting, or pollution events.
- 12.7.38 Whilst impacts arise on the LWSs, context is important, and it is the quality of the features for which such sites are designated that holds the real ecological value and not the label of LWS. In many instances the ecological value of the areas lost is limited and therefore the impact of their loss is equally limited, although it is recognised that some more notable features are also affected. These include the areas of more species diverse grasslands present within the Puriton Cowslip Field LWS and Puriton Meadows and Rail Spur LWS. In order to offset these effects, the features of value will be replicated within the open space provisions within the Site. This will include measures such as soil translocations or seed collection and dispersal to maintain the qualities of features lost. As such, the ecological value is retained onsite, although it will take time for these habitat features to fully establish.
- 12.7.39 Furthermore, the Proposed Development provides ecological benefits with the opportunity to link these features more robustly with other habitats of value onsite and offsite, thereby providing larger, better-connected networks of ecological assets within the Site and wider landscape. This can be achieved through the provision of linear habitat links between features of interest as well as other open space that acts as stepping-stones through the Site that are informed by the Design Guide.
- 12.7.40 Demolition / construction related effects on non-statutory sites are considered to be **direct and indirect, permanent, and temporary, adverse and beneficial** at the **regional** level and of **minor** significance.
- 12.7.41 While the focus is on delivering a smart campus, embedded mitigation and the LDO design code will seek to assure and communicate on mitigation. Compensatory measures through the investment plan can be considered to reinvest in LWS to ensure delivery.

Operational Phase

- 12.7.42 Artificial external lighting has the potential to disturb species that utilise the sites that may result in adverse effects on the qualifying species of the LWSs. However, sensitive qualifying species are limited to Otter that have not been recorded during specific survey work within the Site. The LWSs that they are cited on are to be retained as part of the proposals. As such, the effects are considered to be of no significance.

- 12.7.43 The buildings and additional structural planting within the Proposed Development may result in overshadowing of qualifying features such as vegetation which may affect the structure, condition and composition of the habitats present. The grasslands within the Puriton Meadows and Rail Spur LWS are already subject to overshadowing due to the woodlands present onsite, therefore no further adverse effect is considered to arise. The Puriton Ash Grounds LWS may experience greater levels of overshadowing as a result of the Proposed Development, although the level of change from the baseline conditions is not considered to be significant. The southern parts of the Puriton Rhynes and Ponds LWS and western side of Borrow Pit LWS and Stoning Pound Rhyne LWS, will also experience greater overshadowing, although the features of greatest interest (the rhynes and open water) are already shaded by existing hedgerows and tree lines that serve as screen planting, therefore any change is considered of minor significance.
- 12.7.44 Some recreational use of the Site by the workforce and community is potentially to be promoted including mixed use green open space. This may increase a degree of trampling effects on sensitive habitat where there is a focus on re-wilding within the Site, although this is limited to habitats such as unimproved grasslands which are limited in extent within the Proposed Development.
- 12.7.45 Further mitigation is proposed in respect of the sensitive management of the habitats and features to be retained and created within the Site.
- 12.7.46 Operation related effects on non-statutory sites are considered to be **direct and indirect**, permanent, **adverse** at the **regional** level and of **minor** significance.

Habitats

Improved Grassland

Demolition / Construction Phase

- 12.7.47 The extent of improved grassland will be reduced as part of the Proposed Development. Improved grassland fields are present outside the 2017 Planning Consent, but within the Site and will be lost to development or through the provision of new planting or more ecologically valuable habitat.
- 12.7.48 The improved grassland holds relatively little ecological value in its own right being relatively species poor and subject to a more intensive management regime than other grasslands of greater ecological value.
- 12.7.49 Demolition / construction related effects on improved grassland are considered to be of **negligible** significance.

Operational Phase

- 12.7.50 Improved grassland is not considered sensitive to any potential operational effect. Therefore, operational related effects on improved grassland are considered to be of **negligible** significance.

Semi-Improved Grassland

Demolition / Construction Phase

- 12.7.51 Semi-improved grassland within the Site will be lost as part of the Proposed Development in areas where safeguarded land energy production was proposed by the 2017 Planning Consent. These grasslands have been subject to significant disturbance as part of the remediation process, they are not considered to be species rich grasslands and therefore have limited ecological value.

- 12.7.52 The areas of more valuable semi-improved grassland within the Site are outside of the development plots. Areas will be lost to development as part of the losses to some of the LWSs (Puriton Cowslip Field LWS, Puriton Rhynes and Ponds LWS and subject to the rail alignment, Puriton Ash Ground and Puriton Meadows and Rail Spur) with other areas retained and enhanced (e.g. Puriton Rhyme and Ponds LWS, North Mead Drove Fields and subject to the rail alignment, Puriton Ash Ground and Puriton Meadows and Rail Spur).
- 12.7.53 The landscape strategy will be designed such that areas of new grassland provision will be of a higher value to biodiversity than the habitat lost. Areas of existing improved grassland in the southeast, southwest and northwest will be enhanced to increase species richness with overseeding with native seed mixes. There are opportunities to contribute to compensatory and restoration schemes through the investment plan.
- 12.7.54 Demolition / construction related effects are assessed to be **direct and indirect, permanent, and temporary, adverse and beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.7.55 Given the proximity of some areas of semi-improved grassland to the built form, there is potential for indirect effects to arise including overshadowing. Overshadowing will occur primarily in the northern areas of the Proposed Development where the buildings are tallest. Such effects are likely to be more pronounced on the immediately adjacent road, rail and hardstanding, however on a precautionary basis, it has been assumed that at least some shading of grassland over and above baseline will occur. The effect of overshadowing can lead to changes in the species composition of grasslands and potentially reduce their overall floral diversity, with knock on effects for those invertebrates which rely on warm sunny conditions. The magnitude of any effect is however likely to be not significant, given the large extent of grassland in the north of the Site and additional habitat delivery elsewhere.
- 12.7.56 Further mitigation is proposed in respect of the sensitive management of the habitats and features to be retained and created within the Site.
- 12.7.57 Operation related effects on semi-improved grassland are considered to be **indirect and direct, permanent, adverse** at the **local** level and of **minor** significance.

Amenity Grassland / Planting

Demolition / Construction Phase

- 12.7.58 Amenity grassland / planting holds relatively little ecological value in its own right being relatively species poor and subject to a more intensive management regime as well as containing non-native species. Therefore, any losses or replacement to this habitat is considered not significant overall.
- 12.7.59 Demolition / construction related effects on amenity grassland / planting is considered to be of **negligible** significance.

Operational Phase

- 12.7.60 Amenity grassland / planting is not considered sensitive to any potential operational effect. Therefore, operational related effects on improved grassland are considered to be of **negligible** significance.

Marshy Grassland

Demolition / Construction Phase

- 12.7.61 Areas of marshy grassland will be lost to the Proposed Development with the losses to the Woolavington Road and Fields North LWS and the grasslands within the plantation woodland to the northwest of the Site. However, it is important to note that southern half of the marshy grassland within the Woolavington Road and Fields North LWS falls outside of the 2017 Consent boundary and is considered to be of diminishing value due to the development of scrub and tall ruderal / swamp vegetation that is reducing the extent and quality of the marshy grassland.
- 12.7.62 Areas of marshy grassland will be retained and expanded in areas near the northern section of the Gravity Link Road and new areas will be created as part of the surface water management strategy around new ponds and SuDS features, in line with the Design Guide. Any such areas will be utilised to deliver species rich wet habitats and allow for a greater connectivity of such habitat through the Site.
- 12.7.63 Demolition / construction related effects on marshy grassland are **direct, permanent, adverse**, and **beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.7.64 Overshadowing effects on marshy grasslands will be very limited as such habitats are typically located away from the taller buildings onsite, any areas of marshy grasslands that are subject to overshadowing are considered to be insignificant.
- 12.7.65 Some workforce, recreational use of the Site is to be potentially promoted including mixed use green open space. This may increase trampling effects on sensitive habitat within the Site. Marshy grassland can be sensitive to such pressures, although with the provision of suitable pathways and proper management of the areas such effects are considered to be minimal and can be secured as part of further mitigation (discussed further below). Therefore, operational related effects on marshy grassland are considered to be of **negligible** significance.
- 12.7.66 Operation related effects on marshy grassland are **direct, permanent, adverse** at the **local** level and of **minor** significance.

Plantation Woodland

Demolition / Construction Phase

- 12.7.67 Some areas of plantation woodland within the Site are being retained within the Proposed Development, while others will be lost. There is a risk of accidental damage to these habitats during the construction phase of accidental encroachment by construction traffic, this can be controlled as part of the FDCEMP.
- 12.7.68 Retained woodland will be protected by fencing to prevent accidental damage to the trees and encroachment of vehicles into the root protection zones. These will be kept in place during the construction phase to ensure that no accidental damage is caused. Measures to protect trees during the construction phase are set out in the arboriculture report in **Appendix 14.4**.
- 12.7.69 Significant areas of new woodland structure and screen planting are proposed as part of the landscape strategy for the Proposed Development. This will offset losses to plantation woodland and allow for new wooded areas to be created of greater species diversity with management that promotes better structural diversity.

- 12.7.70 Demolition / construction related effects on plantation woodland are considered to be **direct, permanent, adverse**, and **beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.7.71 Overshadowing is not considered to significantly affect the woodland habitats.
- 12.7.72 Recreational use of the woodland within the Site is potentially to be promoted including mixed use green open space. This may increase trampling effects on sensitive habitat within the Site including ground flora within woodlands. However, not all proposed woodland areas will be open for access within the Site.
- 12.7.73 Where access is provided, areas will be managed to ensure that no significant disturbance or permissive pathways are established. Indeed, effective management of these sites will result in habitats of greater value as they mature. This is considered as part of further mitigation.
- 12.7.74 Operation related effects on plantation woodlands are considered to be **direct**, permanent, **adverse** at the **local** level and of **minor** significance.

Orchard

Demolition / Construction Phase

- 12.7.75 Some areas of orchard within the Site are being retained within the Proposed Development with others lost. Whilst features of the orchards are present, the majority of the trees present are in poor condition and require significant interventions or complete replacement.
- 12.7.76 There is a risk of accidental damage to these habitats during the construction phase of accidental encroachment by construction traffic, this can be controlled as part of the FDCEMP.
- 12.7.77 Retained orchard will be protected by fencing to prevent accidental damage to the trees and encroachment of vehicles into the root protection zones. These will be kept in place during the construction phase to ensure that no accidental damage is caused. Measures to protect trees during the construction phase are set out in the arboriculture report in **Appendix 14.4**.
- 12.7.78 Significant areas of open space are proposed as part of the landscape strategy that will include planting of fruit bearing trees. This offset losses to orchard trees and allows for new habitat to be created with proper management that promotes better fruit growth.
- 12.7.79 In addition, retained areas of orchard can be subject to further betterment through the propagation of new trees from grafted material taken from existing trees. This will help to preserve the existing cultivars at the site, noting that orchard fruit trees are very often extremely localised in terms of provenance. This is viewed as a significant benefit from a cultural, amenity and ecological perspective (preserving and restoring old orchards is of particular value to invertebrates).
- 12.7.80 Demolition / construction related effects on orchards are considered to be **direct, permanent, adverse**, and **beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.7.81 Overshadowing is not considered to significantly effect orchard habitat on Site due to the lack of taller built form in the areas to the southeast of the Site where it is to be retained.
- 12.7.82 Operation related effects on orchard are considered to be of **negligible** significance.

12.7.83 Orchard management is considered as part of further mitigation.

Trees and Scrub

Demolition / Construction Phase

- 12.7.84 Trees are generally restricted to roadsides and boundary features that will be lost in some areas with some being able to be retained. The majority are Horse Chestnut *Aesculus hippocastanum* and other non-native trees. Losses are therefore considered to be of negligible significance.
- 12.7.85 The extent of scrub is limited and is present in areas in the west of the Site. The scrub that covers the railway embankments will be retained wherever possible, along with other areas of scrub surrounding the retained woodland blocks. When the railway line is re-opened most of the scrub on the embankments will be able to be retained, with only the top of the track being cleared to make way for the new track.
- 12.7.86 Significant areas of new screen planting and trees are proposed as part of the landscape strategy for the Proposed Development. This will offset losses to trees and scrub and allow for new areas to be created of greater native species diversity with management that promotes better structural diversity.
- 12.7.87 Demolition / construction related effects on trees and scrub are considered to be **direct**, **permanent**, **adverse**, and **beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.7.88 Overshadowing is not considered to significantly effect tree and scrub habitats.
- 12.7.89 Operation related effects on trees and scrub are considered to be of **negligible** significance.
- 12.7.90 Tree and scrub management is considered as part of further mitigation below at section 12.9.

Hedgerows

Demolition / Construction Phase

- 12.7.91 Hedgerows within the Site will be lost, with retained elements located to the southeast of the Site as part of the open space and in the northwest within the Puriton Meadows and Rail Spur LWS. The majority of the hedgerows to be lost are species poor and have limited ecological value. A few of the hedgerows are more species rich and provide good connective habitat.
- 12.7.92 There are significant stretches of structure and screen planting as indicated on the strategic landscape parameters plan. This structure screen planting will be a linear and will act as a similar function to the hedgerows lost providing good connective habitat along the route of the Gravity Link Road and Site boundaries. Hedgerow planting will also be a component of on plot planting as informed by the Design Guide. This will provide significant connectivity through the Site. New hedgerow planting will contain native species and be species rich and therefore of significantly greater value than the majority of hedgerows present currently.
- 12.7.93 The retained hedgerows within the Site could be damaged during the construction phase by encroachment by construction traffic. Such impacts can be controlled as part of the FDCEMP.
- 12.7.94 Demolition / construction related effects on hedgerows are considered to be **direct**, **permanent**, **adverse**, and **beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.7.95 Overshadowing is not considered to significantly effect hedgerow type habitats.
- 12.7.96 Operation related effects on hedgerows are considered to be of **negligible** significance.
- 12.7.97 The retained hedgerows within the Site will be managed to improve their structure and diversity that has been lost due to lack of management. This will involve a more regular cutting regime and bolster planting where necessary. This is considered as part of further mitigation.

Ephemeral / Short Perennial Vegetation

Demolition / Construction Phase

- 12.7.98 The ephemeral / short perennial habitat present within the Puriton Ash Grounds LWS will be retained within the Proposed Development. New areas of ephemeral habitat will also be created within the Site to provide pockets of invertebrate habitat that act as stepping-stone habitats connections.
- 12.7.99 There is potential for damage to this habitat to occur from encroachment by construction traffic and storage of materials, although some level of habitat disturbance is beneficial to the maintenance of the habitat. Such impacts can be controlled as part of the FDCEMP.
- 12.7.100 Demolition / construction related effects on ephemeral / short perennial vegetation are considered to be of **direct, permanent, beneficial at the local level and of minor significance**

Operational Phase

- 12.7.101 As the main component of ephemeral / short perennial habitat is to be retained within the Puriton Ash Grounds LWS, which is set away from the taller elements of built form, overshadowing is considered to be of negligible significance.
- 12.7.102 Operation related effects on hedgerows are considered to be of **negligible** significance.

Standing Water

Demolition / Construction Phase

- 12.7.103 The ponds situated to the northwest and southeast of the Site will be lost as part of the Proposed Development as will other artificial water bodies (e.g., ditches). The Borrow Pit, the SuDS features associated with the Gravity Link Road and rhynes within the Puriton Rhynes and Ponds LWS will not be affected by the Proposed Development.
- 12.7.104 New water attenuation features will be created in the northeast of the Site as part of the surface water management strategy. Any such waterbody will also be utilised to deliver ecological benefits.
- 12.7.105 The newly created ponds will be fenced off during the construction phase to ensure that there is no accidental damage within these areas.
- 12.7.106 The FDCEMP will ensure that surface water contamination and dust deposition will be controlled to prevent any contamination of the water bodies within the site. It also details regulations about storing hazardous materials away from these ponds to prevent a potential pollution event.

12.7.107 Demolition / construction related effects on standing water are considered to be **direct**, permanent, **adverse** at the **local** level and of **minor** significance.

Operational Phase

12.7.108 Overshadowing can adversely affect the development of aquatic plants and localised effects of shading of rhynes will reduce floral diversity. However, given the extensive areas of standing water that are retained onsite that will not be subject to overshadowing, the effects are considered to be insignificant.

12.7.109 Operation related effects on standing water are considered to be of **negligible** significance.

12.7.110 The management of standing water is included as part of further mitigation within section 12.9 below.

Reed Bed

Demolition / Construction Phase

12.7.111 The reed beds to the north of the Site and those surrounding the Borrow Pit will not be directly affected by the Proposed Development.

12.7.112 There is the potential for contaminated runoff entering the water system that will flow through the reed beds, this will be controlled through the FDCEMP.

12.7.113 Demolition / construction related effects on reed beds are considered to be of **negligible** significance.

Operational Phase

12.7.114 Operation related effects on standing water are considered to be of **negligible** significance.

Fauna

Bats

12.7.115 All bats are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and included on Schedule 2 of the Conservation of Habitats and Species Regulations 2017 ("the Habitats Regulations"). These include provisions making it an offence to:

- Deliberately kill, injure, or take (capture) bats;
- Deliberately disturb bats in such a way as to be likely to significantly affect:-
 - (i) the ability of any significant group of bats to survive, breed or rear or nurture their young; or to hibernate; or
 - (ii) to significantly affect the local distribution or abundance of the species concerned;
- Damage or destroy any breeding or resting place used by bats;
- Intentionally or recklessly obstruct access to any place used by bats for shelter or protection (even if bats are not in residence).

12.7.116 While the legislation is deemed to apply even when bats are not in residence, Natural England guidance suggests that certain activities such as re-roofing can be completed

outside sensitive periods when bats are not in residence provided these do not damage or destroy the roost.

- 12.7.117 The words ‘deliberately’ and ‘intentionally’ include actions where a court can infer that the defendant knew ‘the action taken would almost inevitably result in an offence, even if that was not the primary purpose of the act.
- 12.7.118 The offence of damaging (making it worse for the bat) or destroying a breeding site or resting place is an absolute offence. Such actions do not have to be deliberate for an offence to be committed.
- 12.7.119 Licences can be granted for development purposes by an ‘appropriate authority’ under Regulation 55 (e) of the Habitats Regulations. In England, the ‘appropriate authority’ is Natural England (the government’s statutory advisors on nature conservation). European Protected Species licences permit activities that would otherwise be considered an offence.
- 12.7.120 In accordance with the Habitats Regulations the licensing authority (Natural England) must apply the three derogation tests as part of the process of considering a licence application. These tests are that:
1. The activity to be licensed must be for imperative reasons of overriding public interest or for public health and safety;
 2. There must be no satisfactory alternative; and
 3. The favourable conservation status of the species concerned must be maintained.
- 12.7.121 Licences can usually only be granted if the development is in receipt of full planning permission (and relevant conditions, if any, discharged).
- 12.7.122 Seven species of bat are Priority Species, these are Barbastelle, Bechstein’s Myotis *bechsteinii*, Noctule, Soprano Pipistrelle, Brown Long-eared, Greater Horseshoe, and Lesser Horseshoe.

Demolition / Construction Phase

- 12.7.123 The three mitigation bat buildings (all known to support Brown Long-eared Bats) are being fully retained as part of the Proposed Development. They are located in an area of proposed structural planting that connects the field and hedgerow network in the southeast of the Site and the Puriton Rhynes and Ponds LWS to the north.
- 12.7.124 Other roosts are present within the 37 Club (a maternity Common Pipistrelle roost), the derelict dwelling on Woolavington Road (minor Brown Long-eared Bat roost) and two pill boxes (minor / transitory occasional Lesser Horseshoe roosts of singleton bats) to the south of the Site. These will be lost to the Proposed Development. This represents direct adverse impacts to bats using the Site. In order to remove the roosts a Natural England licence will be required that will require alternative roost sites to be provided within the Site. This is discussed further within section 12.9.
- 12.7.125 The loss of other habitats of value including hedgerows and woodland edge habitat will reduce the commuting and foraging habitat within the Site. However, the increased vegetation planting, creation of wetland features, greater connectivity of ecological features (both within the Site and wider landscape) and habitat management around the Site will provide further foraging opportunities for bats.
- 12.7.126 Structure planting around the mitigation roosts and adjacent to the development plots will also limit the light spill into these areas.

12.7.127 Demolition / construction related effects on bats are considered to be **direct, permanent, adverse** at the **National** level and of **moderate** significance.

Operational Phase

12.7.128 The lighting strategy seeks to limit light spill into areas of potential bat foraging and commuting habitat (such as retained woodland, hedgerows and Local Wildlife Sites) and the mitigation roosts provided. This will involve using directional and hooded lighting wherever possible, within the vicinity of these areas to direct light towards the highways and development loading bays or similar.

12.7.129 The lighting strategy has been developed to mitigate potential effects to foraging and commuting bats on the Lighting Constraints Plan (**Appendix 14.5**). This shows 'low energy corridors' where detailed lighting scheme design will be sensitive to the need to minimise lighting levels and the illumination of habitat features, such that they hold value for bat foraging and movement.

12.7.130 As part of this strategy, additional measures to mitigate potential adverse effects to bats using the 'low energy corridors' have been put forward and a range of such measures will be implemented along primary roads, secondary access points and vehicle crossings that come into conflict with the bat foraging and movement corridors. Such measures will be of benefit to bats and also dovetail with the concepts of sustainability and lower energy consumption.

12.7.131 This includes providing, where possible, gaps in lighting columns a variable lighting regime that reduces lighting intensity at certain times, use of LED lighting, use of shields to restrict spillage and providing a central control system.

12.7.132 As part of the detailed lighting strategy, a plan showing horizontal lux contour lines of the proposed development will be produced (a predicted post-development light distribution plan), that would demonstrate that light levels will not deter use by bats within key bat foraging and movement corridors, remaining under 1 lux where possible, or not exceed current baseline levels.

12.7.133 Public access, if provided, through the Site may provide access to the new bat roosts and there is a possibility of vandalism or damage to these structures.

12.7.134 A post and rail fence will be erected around the structures to discourage people from getting access to the buildings. However, the bat mitigation structures have been designed to ensure that there is limited possibility of vandalism occurring. The underside of these structures have been clad in steel sheet to prevent the risk of fire and prevent damage.

12.7.135 Operation related effects on bats are considered to be both **indirect** and **direct, permanent, adverse** at the **National** level and of **minor** significance.

Badgers

12.7.136 The Protection of Badgers Act 1992 consolidates the previous Badgers Acts of 1973 and 1991. The legislation aims to protect the species from persecution, rather than being made in response to an unfavourable conservation status.

12.7.137 As well as protecting the animal itself, the 1992 Act also states that the intentional or reckless destruction, damage or obstruction of a Badger sett would be an offence. A sett is defined as 'any structure or place, which displays signs indicating current use, by a Badger'. 'Current use' is defined by Natural England as a use which may have taken place within the preceding 12 months.

12.7.138 In addition, the intentional elimination of sufficient foraging areas within which to support a known social group of Badgers may, in certain circumstances, be construed as an offence by constituting the 'cruel ill treatment' of a Badger.

12.7.139 Local Authorities are therefore obliged to consult Natural England over any application that is likely to adversely affect Badgers.

12.7.140 Any work that disturbs Badgers is illegal without a prior approval licence having been granted by Natural England. Unlike the general conservation legislation, the Badgers Act 1992 makes specific provision for the granting of licences for development purposes, including for the destruction of setts.

Demolition / Construction Phase

12.7.141 Existing badger setts in the west of the Site associated with the railway spur will require closure in order to facilitate development. Furthermore, given the mobile nature of the species, throughout the construction period, new setts may be created as badgers explore new habitats and will require subsequent closure. Monitoring will be required, or areas made unsuitable to avoid this. As part of any sett closures new artificial setts may be required.

12.7.142 There is potential for Badgers to be harmed during the construction phase through physical harm if a Badger should become trapped within a trench or works associated with the development. Any pits or trenches that are dug on Site during the construction phase should be securely covered during night periods or a ramp provided to ensure that Badgers cannot get trapped within them. Further detail is included within the FDCEMP.

12.7.143 There will be some loss of foraging habitat as a result of the Proposed Development through the loss of woodland, semi-improved grassland and amenity grassland. The landscaping strategy has included large areas of retained grassland, along with nutrient poor grasslands, amenity grassland, structure and screen planting, wet grasslands and swales that will all offer good foraging habitats for Badgers in the future.

12.7.144 There is the potential for lighting to disturb foraging Badgers from the development plots and the associated roads during the construction phase.

12.7.145 As a general rule any active setts will have an appropriate exclusion / sensitivity area demarked on the ground where no storage or construction activity (excavation) can take place. Such areas will be determined using professional judgement based on the location, type and orientation of the sett. It is envisaged that in some instances the exclusion zones will extend to around 30m, while in other circumstances a reduced exclusion zone could be appropriate.

12.7.146 Demolition / construction related effects on badgers are considered to be **direct, temporary, and permanent, adverse** at the **local** level and of **moderate** significance.

Operational Phase

12.7.147 The lighting strategy will be designed to reduce light spill onto sensitive habitats which are integral to the ecological mitigation package in order to reduce and potential disturbance events. Similarly, effects of noise disturbance will need to be considered in respect of activities onsite to prevent disturbance in close proximity to known badger setts. However, any newly created artificial setts will be located at a significant distance from active development areas (such as in the far west) to avoid such effects.

12.7.148 The potential for increased public access across the Site may increase the potential for Badger setts to be identified and disturbed. However, the preferred locations for any artificial setts and associated tree group / scrub planting are sited away from direct access and cover is provided by dense woody vegetation.

12.7.149 There is the potential for future conflict between Badgers and amenity (and other) site uses, such as Badgers causing damage to these areas and also potential for Badgers being killed / injured in collisions with vehicles. In both instances, the main element of the mitigation

strategy is to ensure a sufficient quantity of good quality, sheltered foraging and sett building habitat in a location removed from the main operational part of the development.

- 12.7.150 Operation related effects on badgers are considered to be both **indirect** and **direct**, **permanent**, **adverse** at the **local** level and of **minor** significance.

Birds

- 12.7.151 Section 1 of the Wildlife & Countryside Act is concerned with the protection of wild birds. With certain exceptions all wild birds and their eggs are protected from intentional killing, injuring and taking; and their nests, whilst being built or in use, cannot be taken, damaged or destroyed.

- 12.7.152 Schedule 1 of the Wildlife & Countryside Act 1981 is a list of the nationally rarer and uncommon breeding birds for which all offences carry special (i.e. greater) penalties. These species also enjoy additional protection whilst breeding, as it is also an offence to disturb adults or their dependant young when at the nest.

Demolition / Construction Phase

- 12.7.153 Direct impacts on nesting birds during site clearance can occur through loss of foraging and nesting habitats and the potential to destroy nests. Wherever possible, no vegetation clearance will be undertaken during the bird nesting season, from March to August inclusive. If vegetation removal is required, then a check must be undertaken by a suitably qualified ecologist to check for evidence of nesting birds. If a nest is discovered, then a 5m cordon around that nest should be established and no clearance should take place within this cordon before the chicks have fledged the nest.

- 12.7.154 Bird species listed on schedule 1 of the Wildlife and Countryside Act 1981 such as Cetti's Warbler and Marsh Harrier are known to be present within the reed bed, rhynes and fishing ponds to the northeast of the Site. These species are afforded additional protection from disturbance during the breeding season. Given that the habitats these birds utilise are, in the main, to be retained and set away from the development, it is considered that any disturbance effects are of negligible significance.

- 12.7.155 A number of red listed bird species on the Birds of Conservation Concern list are present within the Site. These include Cuckoo *Cuculus canorus*, Herring Gull *Larus argentatus*, House Sparrow *Passer domesticus*, Linnet *Linaria cannabina*, Mistle Thrush *Turdus viscivorus*, Song Thrush *Turdus philomelos* and Starling *Sturnus vulgaris*. None of these species are considered to be reliant on the Site and furthermore, these species were generally recorded at the Site's periphery where habitats are to be retained and subject to betterment.

- 12.7.156 The extensive landscape and structure planting will provide foraging and nesting opportunities for birds known to utilise the Site, subject to appropriate design.

- 12.7.157 Demolition / construction related effects on birds are considered to be **direct**, **temporary**, **adverse** and **beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.7.158 There is the potential for disturbance of foraging Barn Owl from light spillage from the Proposed Development and road network. However, Barn Owl are known to benefit from a level of lighting as this assists night-time foraging. The lighting strategy will be designed to minimise light spill into areas managed for nature conservation and will provide low energy corridors where possible. Barn Owl boxes proposed to be installed will be situated in areas within suitable foraging habitat such as areas of retained and enhanced grassland.

- 12.7.159 Operation related effects on birds are considered to be of **negligible** significance.

Reptiles

Demolition / Construction Phase

- 12.7.160 Only Grass Snake have been recorded as present and distribution is considered to be limited within areas affected by the Proposed Development.
- 12.7.161 Grass Snake are protected from killing injury under the Wildlife and Countryside Act 1981 (as amended). Their habitat is not protected. It will be necessary to instigate a mitigation strategy which prevents harm to individuals during site clearance works, although the species will persist in the local area including retained habitat outside of the development footprint.
- 12.7.162 Construction related effects on reptiles are considered to be **direct and indirect, permanent, adverse** at the **local** level and of **minor** significance

Operational Phase

- 12.7.163 The surface water management strategy and enhancement to grasslands in the north of the Site and the reed bed rehabilitation provide betterment for this species within the Site. Further, the creation of habitat / log piles in close proximity to water bodies will provide enhanced hibernation opportunities.
- 12.7.164 Operation related effects on reptiles are considered to be **indirect, permanent, beneficial** at the **local** level and of **minor** significance.

Water Voles

- 12.7.165 Water Vole received limited legal protection in April 1998 through its inclusion in Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) for some offences. This protection was extended in April 2008 so the Water Vole is now fully protected under Section 9 of the Act.
- 12.7.166 Legal protection makes it an offence to:
- Intentionally kill, injure, or take (capture) a Water Vole;
 - Possess or control a live or dead Water Vole, or any part of a Water Vole;
 - Intentionally or recklessly damage, destroy or obstruct access to any structure or place which Water Voles use for shelter or protection or disturb Water Voles while they are using such a place; and
 - Sell, offer for sale or advertise for live or dead Water Voles.
- 12.7.167 The law only applies to wild animals, so the possession of captive-bred Voles is not an offence.
- 12.7.168 Water Vole is a UK Priority species.
- 12.7.169 Licences are available from Natural England to allow activities that would otherwise be offences for:
- Scientific or educational purposes;
 - The purpose of ringing or marking;
 - Conserving wild animals or introducing them to particular areas;

- Preserving public health or public safety;
- Preventing the spread of disease; and
- Preventing serious damage to any form of property or to fisheries.

12.7.170 There is no express provision under the Wildlife & Countryside Act 1981 for licensing what would be classed as offences for the purpose of development, maintenance or land management (such as is applicable for other e.g. European protected species). If a proposed development or maintenance work would impact upon Water Voles then (as far as is reasonable) appropriate action should be taken to safeguard the animals and the places they use for shelter and protection.

12.7.171 Where a developer considers that the best outcome for Water Voles is capture and translocation to a different location there may be grounds for issuing a translocation licence for the purpose of 'conservation'. Whilst Natural England will consider applications on their individual merits, licences to trap and remove Water Voles from a development site for the purpose of conservation will only be granted where the applicant can show that:

- The activity proposed is lawful, i.e. for development, the work has been granted planning permission or is subject to other lawful authority;
- The development and the likely impacts on Water Voles could not reasonably have been avoided, i.e. all reasonable efforts should be made to retain the Water Voles on Site and alternatives that would have a lesser impact on the Voles should have been considered; and
- The translocation of the Water Voles would produce a conservation benefit, i.e. any Water Voles were translocated to a suitable site using an appropriate methodology, as described in the Water Vole Conservation Handbook.

Demolition / Construction Phase

12.7.172 Water Vole habitat within the Site will be lost to the Proposed Development. This includes all known aquatic habitats that cannot be retained or require realignment.

12.7.173 The population is considered small and dispersed due to the varying suitability of habitat onsite and presence of American Mink.

12.7.174 The mitigation strategy is based around trapping and relocation to an offsite location to ensure the population is safeguarded for the long term. The detail in relation to the methodologies and receptor location is to be agreed with the Natural England licencing team.

12.7.175 Demolition / construction related effects on Water Vole are considered to be **direct, permanent, adverse** at the **local** level and of **moderate** significance.

Operational Phase

12.7.176 Water Vole will not be present onsite post construction therefore there will be **no** effect. However, over the long term it is possible that they will recolonise suitable habitat within the Site from the surrounding areas.

Great Crested Newts

12.7.177 All British amphibian species receive a degree of protection under the 1981 Wildlife and Countryside Act (as amended). The level of protection varies from protection from sale or

trade only, as is the case with species such as Smooth Newt and Common Toad, to the more rigorous protection afforded to species such as the Great Crested Newt.

12.7.178 Although Great Crested Newts are regularly encountered locally and throughout much of England, the UK holds a large percentage of the world population of the species. As such the UK has an international obligation to conserve the species and they receive full protection under domestic and European legislation and are a material consideration as part of the NPPF.

12.7.179 More specifically, Great Crested Newts are also protected under UK law by the Habitats Regulations, which lists Great Crested Newts under Schedule 2.

12.7.180 Great Crested Newts are thus protected from deliberate killing, injury or capture with their habitat, including a breeding site, resting place or any structure or place used for 'shelter or protection' and are also protected against deliberate or reckless damage or destruction. It is also illegal to disturb Great Crested Newts and their eggs deliberately or recklessly as they are protected from taking or destroying.

Demolition / Construction Phase

12.7.181 Great Crest Newt habitat within the Site will be lost to the Proposed Development. This includes known breeding ponds in the northwest of the Site and terrestrial habitat in the northwest and southeast of the Site. Further mitigation will be provided as part of a District level Licence Scheme to secure and create offsite habitat to ensure core GCN populations are safeguarded for the long term, maintaining the favourable conservation status of the species. However, a remnant population may be retained on site where ponds known to support GCN are not lost directly to the Proposed Development.

12.7.182 Demolition / construction related effects on GCN are considered to be **direct, permanent, adverse** at the **National** level and of **major** significance.

Operational Phase

12.7.183 GCN will not be present onsite post construction therefore there will be **no effect**.

Invertebrates

Demolition / Construction Phase

12.7.184 There is potential for pollution or contaminated run off to enter the water system and potential damage the habitats that these species inhabit. Such potential effects will be managed through the provision of a FDCEMP.

12.7.185 Habitats of value to invertebrates include the orchard habitat which is to be partially lost. However, supplementary fruiting tree planting will be included within the proposed open space areas. Furthermore, extensive enhancements to the wetland features in the north of the Site will provide direct benefits to this species group.

12.7.186 Blackthorn will be planted within the structure and screening planting to specifically to provide a food source for the Brown Hairstreak butterfly that has been recorded on Site.

12.7.187 Demolition / construction related effects on invertebrates are considered to be **direct, permanent, adverse**, and **beneficial** at the **local to district** level and of **minor to moderate** significance.

Operational Phase

12.7.188 Operation related effects on invertebrates are considered to be of **negligible** significance.

12.8 Further Mitigation

- 12.8.1 An Ecological Mitigation and Management Strategy (EMMS) will be prepared for the Site. This is secured through the Mitigation Checklist submitted with the LDO. This report will include consideration of the maintenance / management measures associated with onsite ecological networks and features that are to be retained, enhanced and created within the Proposed Development. As such, the EMMS will set out the key mitigation and management strategies proposed with the aim of delivering a significant long term beneficial ecological effect at the Site. This is secured through the Compliance Form.
- 12.8.2 The overall aim for the Site is to maintain and enhance features of ecological interest retained within the Site in addition to conserving populations of protected species, whilst providing for biodiversity enhancements wherever possible. The EMMS will include a series of management objectives with details on the mitigation / betterment strategies on each of the sensitive ecological receptors that have been identified. Objectives will be set to avoid significant adverse impacts on features due to be retained within the Site.
- 12.8.3 Other species-specific mitigation is detailed below.
- 12.8.4 In addition to onsite mitigation and ecological betterment of retained and newly created habitats, the ecology strategy has a focus on off-site deliverables. These off-site measures are in part necessary to facilitate required mitigation in respect of ensuring the favourable conservation status of protected species (e.g. Great Crested Newts and Water Vole), but equally they are necessary to compensate for losses of habitats of greater ecological value (e.g. areas of more diverse grassland / LWSs) and also to ensure that the proposals meet the national policy requirements relating to providing net gains for biodiversity (paragraph 174 of the NPPF 2021).

Non-Statutory Designated Sites

Operational Phase

- 12.8.5 As part of the future management regime for the Site, a programme of betterment for habitat management is proposed within an EMMS, with the aim of maintaining the retained and enhanced features within the non-statutory designated sites and as well as the newly created features. These features will be managed to promote greater connectivity between habitats and features across a more holistic network of ecologically valuable assets compared to the existing patchwork of designated sites.
- 12.8.6 The proposals will also fund initiatives at the nearby Avalon Marshes. The funding is to be delivered through the investment plan / recycling of business rates generated by the Proposed Development. Funding will be directed towards land acquisition and habitat rehabilitation with the aim of buffering and connecting existing sensitive habitats and restoring natural processes across the Avalon Marshes landscape. These measures will deliver wetland and grassland habitats of significant ecological value, compensating for LWS losses at the Site. The investment plan is secured within the S106.
- 12.8.7 With further mitigation, operation related effects on non-statutory sites are considered to be **direct, permanent, beneficial** at the **regional** level and of **minor** significance.

Habitats

Semi-Improved Grassland

Operational Phase

- 12.8.8 Management of the retained / enhanced grassland as part of the Proposed Development will ensure benefits are maintained for this habitat type in the long term, ensuring that species /

structural diversity is established, and that scrub encroachment does not result in the loss of this habitat from the Site. This will be secured within the EMMS.

- 12.8.9 Grasslands will be allowed to flower and set seed before any cutting takes place. The grassland will be cut on an annual basis with one cut in the late summer / autumn and a further cut towards the end of the growing season or in Spring, if necessary. All arisings will be removed.
- 12.8.10 The overall losses to this habitat which arise, will be more than compensated for through those measures directed at the Avalon Marshes (as described above), such that a net benefit at the local level arises.
- 12.8.11 With further mitigation, operation related effects on semi-improved grassland are considered to be **direct, permanent, beneficial** at the **local** level and of **moderate** significance.

Marshy Grassland

Operational Phase

- 12.8.12 Some recreational use of the Site by the workforce and community is being considered and could be promoted, including mixed use green open space. This may increase trampling effects on sensitive habitat within the Site. Marshy grassland can be sensitive to such pressures, although with the provision of suitable pathways and proper management of the areas such effects are considered to be minimal and can be secured within the EMMS. Therefore, operational related effects on marshy grassland are considered to be of **negligible** significance.
- 12.8.13 Furthermore, the EMMS will include measures to manage these grasslands to promote the establishment of species rich habitat. Grasslands will be allowed to flower and set seed before any cutting takes place. The grassland will be cut on an annual basis with one cut in the late summer / autumn and a further cut towards the end of the growing season or in Spring, if necessary. The management will also control the encroachment of scrub and swamp vegetation that can development in these areas.
- 12.8.14 The overall losses to this habitat which arise, will be more than compensated for through those measures directed at the Avalon Marshes (as described above), such that a net benefit at the local level arises.
- 12.8.15 With further mitigation, operation related effects on marshy grassland are considered to be **direct, permanent, beneficial** at the **local** level and of **moderate** significance.

Plantation Woodland

Demolition / Construction Phase

- 12.8.16 New tree planting should be focussed on the planting of native species of local provenance. Such provision, noting the significant potential for tree planting will mitigate losses to plantation woodland and trees in general at the Site. The proposals would allow for planting to deliver habitat connectivity in key areas which will aid development of tree groups with inherent ecological value as well as providing value to faunal species such as bats and birds.
- 12.8.17 With further mitigation, operation related effects on plantation woodland are considered to be **direct, permanent, beneficial** at the **local** level and of **minor to moderate** significance.

Operational Phase

- 12.8.18 Recreational use of the Site is potentially to be promoted including mixed use green open space. This may increase trampling effects on sensitive habitat within the Site including

ground flora within woodlands. However, not all proposed woodland areas will be open for access within the Site and where access is provided, areas will be managed to ensure that no significant disturbance or permissive pathways are established. Indeed, effective management of these sites will result in habitats of greater value as they mature. Management will be secured through the EMMS.

- 12.8.19 Following further mitigation, operation related effects on plantation woodlands are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Orchard

Operational Phase

- 12.8.20 The current orchards are in a generally poor condition with a lack of orchard trees present and remnant trees in poor condition. With the implementation of a suitable management plan through the EMMS, the restoration and enhancement of the retained areas, the orchard can be brought back to good condition.
- 12.8.21 Following further mitigation, operation related effects on orchard are considered to be **direct, permanent, beneficial** at the **local** level and of **minor to moderate** significance.

Trees and Scrub

Demolition / Construction Phase

- 12.8.22 New structural tree planting as shown on the strategic landscape parameters plan (**Appendix 3.1f**) should be focussed on the planting of native species of local provenance where possible, accepting that those of high amenity value will be required in some instances. Such provision, noting the significant potential for tree planting will mitigate losses to plantation woodland and trees in general at the Site. The proposals would allow for planting to deliver habitat connectivity in key areas which will aid development of tree groups with inherent ecological value as well as providing value to faunal species such as bats and birds.
- 12.8.23 Following further mitigation, demolition / construction related effects on trees and scrub are considered to be **direct, permanent, beneficial** at the **local** level and of **minor to moderate** significance.

Operational Phase

- 12.8.24 The trees and scrub within the Site will come under a suitable management regime through the EMMS with the aim of enhancing the ecological value of this habitat type for the long-term. This will include rotational cutting of scrub areas to promote vigorous growth and structural diversity. Trees will be subject to arboriculture works where necessary to maintain their health.
- 12.8.25 Following further mitigation, operation related effects on trees and scrub are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Hedgerows

Demolition / Construction Phase

- 12.8.26 The opportunity exists, as shown on the strategic landscape parameters plan (**Appendix 3.1f**), to create new hedgerows in order to mitigate losses which arise, and to bolster retained hedgerows with additional shrub and trees planting. Planting should be focussed on the planting of native species of local provenance where possible.

- 12.8.27 Following further mitigation, demolition / construction related effects on trees and scrub are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.8.28 The retained hedgerows within the Site will be managed, as detailed with an EMMS, to improve their structure and diversity which has been lost due to lack of management. This will involve a more semi-regular cutting regime and bolster planting where necessary.
- 12.8.29 Following further mitigation, operation related effects on hedgerows are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Ephemeral / Short Perennial Vegetation

Demolition / Construction Phase

- 12.8.30 Losses are to be mitigated through the creation of habitat containing nutrient poor free draining soils and stony substrates at the 'landscape mound' located in the west of the Site and also in locations along the railway corridor.
- 12.8.31 Following further mitigation, demolition / construction related effects on Ephemeral / Short Perennial Vegetation are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.8.32 The management of this habitat will be detailed within an EMMS in order to promote its condition and prevent it from being colonised by dense perennial species. The vegetation will be cut annually at an appropriate time of year to prevent scrub establishment and seed will be collected from the retained area of vegetation and scattered over the newly created habitat to encourage re-establishment of this plant community.
- 12.8.33 Where appropriate, vigorous species that do establish within the short period after construction will be controlled either by hand pulling or selective herbicide application.
- 12.8.34 Following further mitigation, operation related effects on hedgerows are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Standing Water

Demolition / Construction

- 12.8.35 As noted below with respect to GCN, a licencing strategy will be undertaken that seeks to deliver offsite terrestrial and aquatic habitat for this species. The process will require a significant increase in standing water with as many as four new ponds created for the loss of one known GCN pond. Therefore, there will a significant increase in the number of ponds delivered as part the Proposed Development.
- 12.8.36 In order to ensure that the mitigation is effective the creation of habitats as part of the GCNDLL will be secured as part of the licencing process.
- 12.8.37 Demolition / construction related effects on standing water, following further mitigation, are considered to be **direct, permanent, beneficial** at the **local** level and of **moderate** significance.

Reed Bed

Operational Phase

- 12.8.38 The reed bed will be managed via a cutting regime secured through the EMMS. The cutting regime will reduce the speed at which the reed bed becomes choked, but it is also likely that the reedbed may need to be dug out at times to prevent it becoming totally choked and allowing more terrestrial species to establish again. This will be monitored as part of an EMMS and will only be undertaken when deemed necessary. As part of a wider strategy, the ecological value of the reed bed will also be enhanced with the maintenance of open water areas and drier areas to provide a variety of ecological niches within the habitat.
- 12.8.39 Invasive species such as Himalayan Balsam will be monitored and controlled as necessary within an EMMS.
- 12.8.40 Following further mitigation, operation related effects on reed bed are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Fauna

Bats

Demolition / Construction Phase

- 12.8.41 Roosts are present within the 37 Club (a maternity Common Pipistrelle roost), the derelict dwelling on Woolavington Road (minor Brown Long-eared Bat roost) and two pill boxes (minor Lesser Horseshoe roosts) to the south of the Site. These will be lost to the Proposed Development. This represents direct adverse impacts to bats using the Site. In order to remove the roosts a Natural England licence will be required that will necessitate alternative roost sites to be provided within the Site. It is proposed that these will take the form of 10 hibernation boxes located within suitable habitat. In addition, further provisions of 30 roosting boxes will be installed across the Site within retained habitat to provide additional roosting features for the wider populations of bats utilising the Site. Mitigation for bats is secured within the S106 agreement.
- 12.8.42 No tree roosts have been identified within the Site. Trees within the Site categorised as being of low bat roost potential that are of to be lost will be subject to soft felling, with a precautionary inspection taking place by a suitably experienced ecologist immediately prior to removal. A Natural England licence could be secured if required, ahead of tree removal should bats be identified as roosting within a tree to be felled.
- 12.8.43 On-site habitat creation within the key landscape areas at the site boundary and in particular within the Gravity Park corridor (linking north south) and along the Woolavington Road frontage (east west) will mitigate the effects of losses to foraging and commuting habitats.
- 12.8.44 Off-site habitat delivery initiatives associated with the Avalon Marshes will deliver further benefits to bats through the delivery of good quality foraging areas including species rich grasslands and wetland habitats.
- 12.8.45 Following further mitigation, demolition / construction related effects on bats are considered to be **direct, permanent, beneficial** at the **National** level and of **minor** significance.

Operational Phase

- 12.8.46 The EMMS will include specific provisions to maintain the artificial roosts provide as well as promote the development of natural roost features within retained and newly created habitats. This will include the retention of standing deadwood and the maintenance of commuting corridors for bats to travel along.

- 12.8.47 The open space areas will be kept as dark as possible though the design and layout of structure planting and hedgerow.
- 12.8.48 The lighting strategy (**Appendix 14.5**) has been developed to mitigate potential effects to foraging and commuting bats. 'Low energy corridors' are to be delivered where detailed lighting scheme design will be sensitive to the need to minimise lighting levels and the illumination of habitat features, such that they hold value for bat foraging and movement.
- 12.8.49 As part of this strategy, additional measures to mitigate potential adverse effects to bats using the 'low energy corridors' have been put forward and a range of such measures will be implemented along primary roads, secondary access points and vehicle crossings that come into conflict with the bat foraging and movement corridors. Such measures will be of benefit to bats and also dovetail with the concepts of sustainability and lower energy consumption.
- 12.8.50 This includes providing, where possible, gaps in lighting columns a variable lighting regime that reduces lighting intensity at certain times, use of LED lighting, use of shields to restrict spillage and providing a central control system.
- 12.8.51 As part of the detailed lighting strategy, a plan showing horizontal lux contour lines of the proposed development will be produced (a predicted post-development light distribution plan), that would demonstrate that light levels will not deter use by bats within key bat foraging and movement corridors, remaining under 1 lux where possible, or not exceed current baseline levels.
- 12.8.52 Following further mitigation, operation related effects on bats are considered to be both **indirect** and **direct, permanent, adverse** at the **National** level and of **minor** significance.

Badgers

Demolition / Construction Phase

- 12.8.53 Existing badger setts in the west of the Site associated with the railway spur will require closure under licence in order to facilitate development. In order to safeguard this species, a new artificial sett will be created in the west of the Site. This new sett will be designed to replace the current main sett located within the Site. It will be located in habitat away from the main site operations. The sett will be subject to protective fencing (post and wire or post and rail) to prevent public access and new tree / shrub planting (dense / thorny and fruiting species) will be delivered in the immediate vicinity to offer natural protection and a foraging resource.
- 12.8.54 Demolition / construction related effects on badgers are considered to be **direct**, permanent, **beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.8.55 Habitat management, secured through the EMMS, will provide enhanced foraging and commuting routes through the regular maintenance of suitable habitats and features. It will enable that good cover vegetation is maintained, fruiting trees and shrubs are allowed to flower and produce berries and accessibility is maintained and enhanced across the Site.
- 12.8.56 Following further mitigation, operation related effects on badgers are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Birds

Demolition / Construction Phase

- 12.8.57 New alternative nesting sites will be provided within the Site. These will take the form of 100 nest boxes of varying designs located within suitable habitat for the various populations of breeding birds utilising the Site. Their installation and maintenance will be secured through the EMMS.
- 12.8.58 The inclusion of dense shrub and hedgerow planting, including some fruiting species, as part of detailed landscape proposals will provide foraging and nest building opportunities.
- 12.8.59 Following further mitigation, demolition / construction related effects on birds are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Operational Phase

- 12.8.60 Suitable habitat management, secured as part of the EMMS, will ensure that proposed planting will provide new foraging and nest building habitat for the range of species recorded, by allowing trees and shrub to bear fruit and for dense cover for shelter. Any cutting of vegetation will be timed to avoid the nesting season where possible and activities around sensitive habitats (i.e. the reed bed and fishing ponds) for Schedule 1 birds will be kept to a minimum to further avoid disturbance.
- 12.8.61 Following further mitigation, operation related effects on birds are considered to be **direct, permanent, beneficial** at the **local** level and of **minor** significance.

Water Voles

Demolition / Construction Phase

- 12.8.62 The mitigation strategy for Water Voles involves the onsite population to be captured and released to an offsite location. The detailed strategy is to be agreed with Natural England's licencing department and as part of that strategy benefits will be realised for the population. The receptor habitat will be chosen based on its suitability for the long-term maintenance of the population (habitat condition) and through a Mink monitoring and control programme which would be a requirement of any licence. This is a similar strategy to that previously licenced by Natural England in respect of the remediation works of the ROF. This is secured as an obligation within the S106 agreement.
- 12.8.63 Demolition / construction related effects on Water Vole, following further mitigation, are considered to be **direct, permanent, beneficial** at the **local** level and of **moderate** significance.

Operational Phase

- 12.8.64 Water Vole will not be present onsite post construction therefore there will be **no effect**. However, over the long term it is possible that they will recolonise suitable habitat within the Site from wider areas. The standing water areas will be managed to allow recolonisation by the species where possible with the implementation of an EMMS aimed at delivering ecological enhancements to the rhine system, of possible benefit to the species if they colonise.

Great Crested Newts

Demolition / Construction Phase

- 12.8.65 A Great Crested Newt District Level Licence (GCNDLL) will be sought. District level licensing schemes operate in certain parts of England (including Somerset) to better protect GCN populations. This process involves the allocation of funds, calculated on the basis of the level of impact (i.e. number of ponds to be lost and area of terrestrial habitat loss), towards a strategic project designed for the purpose of creating, enhancing and managing habitat for GCN in areas of particular significance for the species (core population areas). This approach will provide greater benefits to the species overall, as the compensation strategies are designed on the landscape level, rather than seeking to protect (often) isolated populations, typical of a bespoke onsite solution. This is secured as an obligation within the S106 agreement.
- 12.8.66 Not only will the GCNDLL approach deliver benefits for GCN, the provision of good quality and well managed aquatic and terrestrial habitat will have significant benefits to other faunal species.
- 12.8.67 Demolition / construction related effects on GCN, following further mitigation, are considered to be **direct, permanent, beneficial** at the **regional** level and of **moderate** significance.

Operational Phase

- 12.8.68 A remnant population may be retained and over the long term they are likely to recolonise suitable habitat within the Site where it is made available. The standing water areas will be managed to facilitate use by the species as breeding ponds where possible with the implementation of an EMMS aimed at delivering ecological betterment to ponds.

Invertebrates

Demolition / Construction Phase

- 12.8.69 On-site habitat creation within the key landscape areas at the site boundary and in particular within the Gravity Park corridor will mitigate the effects of losses to grassland and wetland habitat. Delivery of sparsely vegetated areas and stony substrate at the existing landscape mound and along the rail corridor will mitigate losses to ephemeral habitat and bare ground. The delivery of this mitigation will be secured through the EMMS.
- 12.8.70 The retention of old orchard trees and new orchard tree planting will be of direct benefit to a range of invertebrates including those reliant on dead wood (saproxylic).
- 12.8.71 Off-site habitat delivery initiatives associated with the Avalon Marshes will deliver further benefits to a wide range of invertebrates associated with species rich grasslands and wetland habitats in particular.

Operational Phase

- 12.8.72 Management of the habitats through the EMMS will aim to enhance the Site for invertebrates, such as allowing deadwood to remain within areas of woodland, creating log piles and providing rubble heaps within the landscape feature. Areas of ephemeral habitat will be subject to cutting and disturbance to maintain conditions optimal for the species group. The standing water and reed bed areas will be managed to facilitate use by invertebrates as breeding, foraging, and sheltering habitat where possible with the implementation of an EMMS aimed at delivering ecological enhancements to the rhyme and reedbed system.
- 12.8.73 Following further mitigation, operation related effects on invertebrates are considered to be **permanent, beneficial** at the **local to regional** level and of **minor** significance.

12.9 Residual Effects

12.9.1 Residual effects are set out below.

Non-Statutory Designated Sites

- 12.9.2 Residual effects on non-statutory designated sites are considered to be **beneficial** at the **regional** level and of **minor** significance.

Habitats

Semi-Improved Grassland

- 12.9.3 Residual effects on semi-improved grassland are considered to be **beneficial** at the **local** level and of **minor** to **moderate** significance.

Marshy Grassland

- 12.9.4 Residual effects on marshy grassland are considered to be **beneficial** at the **local** level and of **minor** to **moderate** significance.

Plantation Woodland

- 12.9.5 Residual effects on plantation woodlands are considered to be **local** level and of **negligible** significance.

Orchard

- 12.9.6 Residual effects on orchard are considered to be **beneficial** at the **local** level and of **minor** significance.

Trees and Scrub

- 12.9.7 Residual effects on trees and scrub are considered to be **local** level and of **negligible** significance.

Hedgerows

- 12.9.8 Residual effects on hedgerows are considered to be **beneficial** at the **local** level and of **minor** significance.

Ephemeral / Short Perennial Vegetation

- 12.9.9 Residual effects on ephemeral / short perennial vegetation are considered to be **beneficial** at the **local** level and of **minor** significance.

Standing Water

- 12.9.10 Residual effects on standing water are considered to be **beneficial** at the **local** level and of **minor** to **moderate** significance.

Reed Bed

- 12.9.11 Residual effects on reed bed are considered to be at the **beneficial** at the **local** level and of **minor** significance.

Fauna

Bats

- 12.9.12 Residual effects on bats are considered to be **neutral** at the **National** level.

Badgers

12.9.13 Residual effects on badgers are considered to be **neutral** at the **local** level.

Birds

12.9.14 Residual effects on birds are considered to be **neutral** at the **local** level.

12.9.15 Invertebrates

12.9.16 Residual effects on invertebrates are considered to be **neutral** at the **local** level.

Water Vole

12.9.17 Residual effects on Water Vole, are considered to be **beneficial** at the **local** level and of **minor** significance.

GCN

12.9.18 Residual effects on GCN, are considered to be **beneficial** at the **local** level and of **minor** significance.

Reptiles

12.9.19 Residual effects on reptiles, are considered to be **neutral** at the **local** level.

12.10 Monitoring

12.10.1 In light of the conclusions set out above in respect of residual effects it is considered that no monitoring is considered necessary.

12.11 Summary

12.11.1 Ecology Solutions Ltd were commissioned by Gravity in 2020 to undertake an Ecological Assessment of the current Site and to undertake a detailed assessment of the proposed development.

12.11.2 The ecological assessment is based on results from field surveys undertaken by Ecology Solutions Ltd in most recently in 2020/21, with reference made to historic survey data collected by Ecology Solutions Ltd and EPI dating back to 2007. Surveys were undertaken to ascertain the general ecological value of the Site and to identify the main habitats and associated plant species. Specific protected species surveys have been undertaken for Badgers, Bats, reptiles, birds, Water Vole, GCN and invertebrates. Further information has been obtained through consultation with the recognised bodies involved in nature conservation in the local area.

12.11.3 The current state of the environment at the Site consists of a mix of bare ground, hardstanding, grasslands, rhynes and ponds, wetlands and woodland. However, the baseline conditions for this assessment are set on a future scenario of 2032, where the 2017 Consent has been delivered.

12.11.4 The ecological features identified through both field surveys and desk-top studies has been interpreted within the context of recognised methodologies and also within the planning policy context, both on a national and local level.

12.11.5 The potential ecological impacts of the proposed development are largely focused on the Site and its immediate surroundings. However, given the sites location within a proximity of a

number of designated statutory, and non-statutory sites, consideration has also been given to the potential impacts and opportunities that arise at a landscape scale.

- 12.11.6 Following the employment of mitigation and enhancement measures as set out in this ES Chapter, there are predicted to be no significant adverse impacts on any statutory and non-statutory sites either alone or in combination with any other plans or projects. Furthermore, the bolstering of retained habitats alongside the introduction of new areas of landscaping will create improved connectivity links with surrounding habitats.
- 12.11.7 In order to facilitate the proposed development, it is expected that habitats, in the main, with relatively low ecological value are to be lost. However, some areas of greater value, within the context of the site will also be lost, namely species rich grassland. By way of mitigation, several new areas of ecologically sensitive landscaping will be introduced. New grasslands will be created with the seed banks of existing grasslands. Furthermore, habitats of relatively higher ecological value within the context of the site (including the rhynes and reed bed) will be retained and subjected to bespoke enhancement regimes. This will mitigate for loss of any habitats.
- 12.11.8 The habitat boundaries are known to support a limited amount of bat activity. Surveys undertaken during 2020 identified several species using the Site including rarer species such as Lesser and Greater Horseshoe bats and Barbastelle. Roosts for Common Pipistrelle, Lesser Horseshoe and Brown Long-eared bats are known to roost within buildings. Due to the central parts of the Site consisting of low suitability habitat for bats, activity is generally restricted to the periphery of the Site. Nonetheless, it is expected that opportunities for foraging / commuting bats are to be safeguarded and enhanced where possible, post-development. However, lighting impacts are considered to effect commuting corridors in some areas for more sensitive bat species. By way of enhancement, bat roosting boxes are to be installed across suitably retained habitat within the Site as part of enhancement measures.
- 12.11.9 In order to safeguard all other nesting bird species, any clearance of suitable vegetation will only occur outside of the nesting season, or immediately following checks from a suitable qualified ecologist. Furthermore, the implementation of an ecologically valuable planting scheme (to include berry bearing trees) , as well as the incorporation of nest boxes of various designs, will enhance opportunities for nesting birds post development in the long run.
- 12.11.10 Great Crested Newts are known to be present within several ponds within the Site, although their dispersal is limited by the due to previous trapping and translocation efforts. As part of further district level licencing, it is proposed that offsite habitats of strategic value will be created to facilitate the loss of habitats present onsite.
- 12.11.11 A similar approach will be taken with respect to Water Vole onsite, with an offsite receptor site secured to receive the population.
- 12.11.12 Badgers are present within the Site and will be retained within areas set away from the Proposed Development. An artificial sett will be created for the resident population and suitable foraging and commuting habitat will be retained and enhanced in close proximity to the sett.
- 12.11.13 As part of providing a greater matrix of habitats to support an enhanced biodiversity across the Site areas of suitable invertebrate will be created. This will include pockets of bare ground and flower rich habitat that are optimal for invertebrates.
- 12.11.14 The retention and creation of ecologically valuable habitats as part of the proposals and the implementation of long-term enhancements will ensure significant benefits to biodiversity in the long-term.

12.11.15 In addition to onsite mitigation and ecological betterment of retained and newly created habitats, the ecology strategy has a focus on off-site deliverables. These off-site measures are in part necessary to facilitate required mitigation in respect of ensuring the favourable conservation status of protected species (e.g., Great Crested Newts and Water Vole), but equally they are necessary to compensate for losses of habitats of greater ecological value (e.g., areas of more diverse grassland / LWSs) and also to ensure that the proposals meet the national policy requirements relating to providing net gains for biodiversity.

12.11.16 As such, no adverse impacts have the potential to arise and indeed the proposals would contribute positively to biodiversity and nature conservation objectives in the local area, as is clearly desired by relevant legislation and planning policy.

12.12 Referencing

12.12.1 CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

12.12.2 Ratcliffe, D A (1977). A Nature Conservation Review: the Selection of Study areas of Biological National Importance to Nature Conservation in Britain. Two Volumes. Cambridge University Press, Cambridge.



Gravity

Smart Campus

Gravity LDO Environmental Statement

**Volume 1 – Chapter 13:
Water Environment**

13 Water Environment

13.1 Introduction

- 13.1.1 This chapter has been prepared by Stantec UK. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulation 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES in **Appendix 1.6**.
- 13.1.2 This chapter assesses the likely significant effects of the Proposed Development with regards to water environment including flood risk and drainage. The key issues identified to be addressed within this assessment relate to:
- The potential fluvial, tidal, surface and groundwater flood risk posed by the demolition, construction and operation of the Proposed Development on the Site and nearby key sensitive receptors (see Table 13.1);
 - The potential flood risk posed by all sources of the Proposed Development during the demolition/construction and operation;
 - The potential pollution risk on the water environment during demolition/construction and operation of the Proposed Development
- 13.1.3 The chapter is supported by the following appendices:
- Appendix 13.1 Flood Risk Assessment (FRA);
 - Appendix 13.2 Surface Water Drainage Strategy (SWDS); and
 - Appendix 13.3 Nutrient Neutrality Statement (NNS).
- 13.1.4 This chapter should be read in conjunction with **Chapter 12 Biodiversity** and **Chapter 15 Climate Change**.
- 13.1.5 The FRA was prepared by Stantec in accordance with the National Planning Policy Framework (NPPF 2021), accompanying guidance and advice (both standard and site-specific) advice from the Environment Agency (EA), Somerset County Council (SCC) and Sedgemoor District Council (SDC). The FRA gives consideration to the flood risk from all sources, taking into account climate change.
- 13.1.6 The SWDS was prepared by Stantec in accordance with the NPPF alongside guidance from SCC, SDC and the SuDS Manual CIRIA (2015) (C753).
- 13.1.7 Within the ROF fence, all significant sources of contamination have been removed as part of the remediation of the Site. Therefore, specific risks associated with the mobilisation of contaminated substance e.g. soil, during demolition and construction phases will not be significant and this matter is therefore scoped out of this assessment.

13.2 Policy, Legislation, Guidance and Standards

National Policy and Legislation

- 13.2.1 The following legislation and policy has informed the assessment of effects within this section:

- National Planning Policy Framework (NPPF) (2021): Paragraph 8 (Achieving Sustainable Development); and, Paragraph 152, 154, 159, 161, 162, 163, 164, 165, 166, 168 and 169. (Meeting the challenge of climate change, flooding and coastal change),
- The Water Environment (Water Framework Directive) (England and Wales Regulations) 2017 (which transpose the Water Framework Directive 2000/60/EC);
- The Water Resources Act 1991 (as amended 2009);
- The Water Act (2003 and 2014);
- The Environmental Protection Act 1990;
- The Land Drainage Act 1991 (as amended 1994);
- The Flood and Water Management Act 2010;
- The Environmental Damage (Prevention and Remediation) Regulations 2009; and
- The Environmental Permitting (England and Wales) Regulations 2010 (which are the regulations that transposed the Groundwater Directive 80/86/EEC).

Guidance

13.2.2 The following guidance is relevant to the Proposed Development:

- Planning Practice Guidance (PPG): Flood risk and coastal change (2014), climate change (2019), land affected by contamination (2019), natural environment (2019), and Water supply, wastewater, and water quality (2019);
- Protecting and improving the water environment – Water Framework Directive compliance of physical works in rivers (2016);
- Environment Agency (EA, 2021) Flood Risk Assessment: Climate Change Allowances;
- Environment Agency (EA, 2018) The Environment Agency's approach to Groundwater Protection;
- Sedgemoor District Council Strategic Flood Risk Assessment Level 1 (SFRA L1) (2015);
- Sedgemoor District Council Strategic Flood Risk Assessment Level 2 (SFRA L2) (2009);
- Somerset County Council Local Flood Risk Management Strategy (LFRMS) (2014);
- Somerset County Council Preliminary Flood Risk Assessment (PFRA) (2011);
- River Basin Management Plan South West River Basin District (2015);
- Environment Agency (EA, 2013) Local Flood Risk Standing Advice for Sedgemoor (LFRSA);
- Environment Agency (EA, 2021) North and Mid Somerset Catchment Flood Management Plan; and
- The SuDS Manual CIRIA (2015) (C753).

Local Planning Policy

13.2.3 The following local planning policy is relevant to the Proposed Development:

- Bridgwater Vision 2015 provides a framework for the planned growth of Bridgwater to 2060 and outlines the vision objectives which underpin the aspirations and ambitions for transformation. This informed the Core Strategy and the Puriton Energy Park Supplementary Planning Document (SPD) 2012. The SPD, adopted March 2012, sets out how the allocation for an Energy Park on the site of the former Royal Ordnance Factory should be developed. The site has subsequently been granted enterprise zone status.
- Subsequent consent for remediation and for the Energy Park has resulted in the SPD being largely superseded.
- Sedgemoor District Council (SDC, 2019) Local Plan 2011-2032
 - Policy S4 Sustainable Development Principles requires development proposals to contribute to *“Minimising the impact on natural resources, avoiding pollution and incorporating the principles of sustainable construction to contribute to energy efficiency, renewable energy, waste reduction and recycling, the use of sustainably sourced materials, sustainable drainage, reduced water use, water quality and soil protection”*.
 - Policy S5 Mitigating the Causes and Adapting to the Effects of Climate Change *“Development should adapt to the effects of climate change by contributing to all of the relevant following objectives: Minimising and where possible reducing the risk of flooding, including avoiding inappropriate development in flood risk areas. Where development is necessary ensuring development is safe over its lifetime without increasing flood risk elsewhere and ensuring appropriate management of land within areas vulnerable to flooding; Water efficiency and other measures to improve drought-resilience, maintain water flows and quality, including the use of sustainable drainage systems”*.
 - Policy D1 Flood Risk and Surface Water Management

“Sequential and Exception Test: In applying the Sequential Test, Exception Test and in undertaking site-specific Flood Risk Assessments regard should be had to the sources of flooding detailed in Sedgemoor’s Strategic Flood Risk Assessment and any more recent mapping made available by the Environment Agency and other flood risk management bodies...”

Surface water drainage: Proposals should seek to reduce flood risk overall through creation of multi-functional green infrastructure and sustainable drainage systems. Betterment will be sought particularly where there are known flooding issues. Where development will result in an increase in the rate of surface water drainage the implications on the wider area should be considered. Sustainable drainage systems should be prioritised for proposals in areas at flood risk and are expected for all major developments (including those in Flood Zone 1). Alternatives will only be permitted where sustainable drainage is impractical or would compromise the viability of the scheme. In instances where conventional drainage systems are used it must still be demonstrated that the development will be safe and flood risk is not increased elsewhere. In all instances proposals should include clear arrangements for ongoing operation and maintenance.

Watercourse / Flood Defence Maintenance: Development proposals will only be supported where they are designed and located to enable suitable access

for maintenance of watercourses and other flood risk management infrastructure”.

- Policy D24 Pollution Impacts of Development “*Development proposals adjacent to a watercourse should incorporate measures to protect the watercourse consistent with the actions of the River Basin Management Plan. The incorporation of SuDS within development proposals that protect and improve water quality will be supported*”.

13.3 Consultation

- 13.3.1 Initial consultation with the Somerset Drainage Boards Consortium (SDBC) and SDC was undertaken as part of the works completed to date (Section 13.4.3), as the principle of the surface water management remains the same and therefore consultees have confirmed the previous consultation is suitable for use in this ES chapter. A Scoping Opinion from SCC as the LLFA on 2nd August 2021, which acknowledged the planning history associated with the site and that assessments should provide a narrative on this and any changes and has been addressed in the SWDS ([Appendix 13.2](#)).
- 13.3.2 Consultation with Natural England was undertaken on 11th February 2021 to discuss the application of their nutrient neutrality advice on the Site based on the Proposed Development. The conclusion of the meeting was that the Site can be screened out of requiring a Nutrient Neutrality Assessment and Mitigation Strategy (NNAMS) based on its location in the water network resulting in no adverse impact on the integrity of the designated site. A copy of the Nutrient Neutrality Statement prepared by Stantec is provided at [Appendix 13.3](#). As such nutrient neutrality is scoped out of this assessment.
- 13.3.3 A Scoping Opinion from the EA was received on 12th August 2021 and consultation with EA is ongoing. Email and telephone discussions with the EA were undertaken on 19th August 2021, in which the EA confirmed the FRA should consider the most recent climate change allowance and a sensitivity test undertaken using the H++ allowance. Based on that, that the EA recommended finished floor levels should be set using the 1 in 200year with climate change allowance design flood level plus a suitable freeboard (300mm). A meeting with EA was held on 28th September 2021, in which the aforementioned points were reiterated. The points raised by the EA have been addressed within the FRA ([Appendix 13.1](#)).

13.4 Methodology

Study Area

- 13.4.1 The water environment study area includes a 500m buffer surrounding the Site. This buffer is considered a suitable extent to assess direct potential impacts as well as encompassing indirect pathways, such as the migration of surface-borne pollutants, and the effects of any prolonged interception of groundwater flows. The Study Area also encompasses surface water features, groundwater features and abstractions, located up to a distance of approximately 500m from the Site, that are considered to be in hydraulic connectivity with the Site, to assess potential adverse effects. All waterbodies within the study area, or those contributing to the water environment have been considered in the assessment. All watercourses within the Study Area, including the Huntspill River, form part of the North and Mid Somerset Catchment Flood Management Plan (CFMP) (EA, 2012) and South West River Basin Management Plan (RBMP) (EA, 2015).
- 13.4.2 All sources of flooding have been reviewed as part of this assessment, with the findings summarised below, and the full assessment contained in the FRA in [Appendix 13.1](#). The assessment of effects on surface water drainage are based on the surface water drainage strategy presented within the SWDS in [Appendix 13.2](#).

Baseline Data Collection

Works Completed to Date

13.4.3 Stantec has been involved in assessing Flood Risk and Drainage at this Site for over 10 years, including in support of the 2017 Planning Consent (42/13/00010). As such, a number of reports and assessments have been completed to date. These are listed below:

- Royal Ordnance Factory Puriton TUFLOW Modelling Report (July 2007)
- Royal Ordnance Factory Puriton TUFLOW Modelling Addendum to Technical Modelling Report (October 2007)
- Royal Ordnance Factory Puriton TUFLOW Modelling Addendum NO.2 of Technical Modelling Report (January 2008)
- Huntspill Energy Park Remediation Application – Flood Risk Assessment (October 2011)
- Borrow Pit Angling Club Flood Risk Assessment (October 2012)
- Huntspill Energy Park Remediation Phase 1 Drainage Scheme (March 2013)
- Huntspill Energy Park Flood Risk Assessment (April 2013)
- Huntspill Energy Park Surface Water Management Strategy (April 2013)
- Huntspill Energy Park Addendum to Surface Water Management Strategy (October 2013)
- Huntspill Energy Park Remediation Application Surface Water Management Strategy (October 2013)
- Huntspill Energy Park Remediation Works Drainage Scheme for Plots J-K (January 2014)
- Puriton Solar Farm Drainage Strategy Technical Note (February 2015)
- Huntspill Solar Park Surface Water Management Strategy (December 2015)
- Land at Puriton Abstraction Assets Assessment (March 2018)
- Huntspill Energy Park Tidal Flood Risk Summary Note (June 2018)

13.4.4 It should be noted that whilst many of the findings and conclusions of the works completed to date have informed this assessment, these documents were undertaken in relation to the 2017 Planning Consent. The area assessed by these documents is smaller in extent than the Proposed Development and Study Area which is assessed in this chapter.

Current State of the Environment

13.4.5 In addition to previous assessments undertaken at the Site, the following key data sources have been used to inform this assessment:

- British Geological Survey mapping (BGS, 2021)
- Magic Map (DEFRA, 2021)
- Environment Agency Flood Map for Planning (EA, 2021a)
- Environment Agency Long Term Flood Risk (EA, 2021b)

- Environment Agency Historic Flood Map (EA, 2021c)
- Environment Agency South West River Basin Management Plan (EA, 2015)
- Environment Agency North and Mid Somerset Catchment Flood Management Plan (EA, 2012)
- Sedgemoor District Council Level 1 Strategic Flood Risk Assessment (SDC, 2015)
- Sedgemoor District Council Level 2 Strategic Flood Risk Assessment (Scott Wilson, 2009)

Flood Risk

- 13.4.6 The existing flood risk baseline conditions were established through a review of available historical information, data and technical reports relating to the Site, the surroundings and environmental sensitivity.
- 13.4.7 As part of the works completed to date hydraulic modelling was undertaken for the Site, since its completion EA climate change allowances have been updated. Updated tidal flood modelling was undertaken as part of the FRA (**Appendix 13.1**).
- 13.4.8 The year 2032 has been identified as the assessment year for operational effects. The 2032 baseline conditions have been determined through professional judgement, taking into account the current state of the environment and the effects of climate change on flood risk. The FRA includes consideration of the effects of climate change on flood risk at the Site over the lifetime of the Proposed Development (up to 2132).

Surface Water Drainage

- 13.4.9 The current state of the environment for the purposes of assessing surface water drainage is the existing drainage regime at the Site.
- 13.4.10 For the 2032 baseline, the existing drainage on the Site has been described in the SWMS and Addendum reports provided as part of the works completed to date (listed in Section 13.4.3).

Sensitive Receptors

- 13.4.11 The sensitivity of a receptor is characterised by its ability to tolerate and recover from changes in the environment as well as its importance to society (i.e. protection under a statutory designation or economic value). Table 13.1 below shows the criteria used to determine receptor sensitivity alongside key water environment receptors that are assessed in this chapter.

Sensitivity	Descriptor	Key Receptor
High	Receptor has little ability to absorb change without fundamentally altering its present character or is of international or national important.	Huntspring River NNR, Severn Estuary SPA / Ramsar, Somerset Levels and Moors SPA / Ramsar. Humans (construction workers, future residents and existing residents) Proposed Development defined in NPPF Flood Risk Vulnerability Classification as "Essential Infrastructure or Highly Vulnerable" (i.e. water treatment works,

		energy generation, distribution and management infrastructure)
Medium	Receptor has moderate capacity to absorb change without significantly altering its present character.	<p>Floodplain (Modelled extent)</p> <p>Humans (workers in commercial/industrial Proposed Development)</p> <p>Proposed Development defined in NPPF Flood Risk Vulnerability Classification as “More Vulnerable” (i.e. residential dwellings, educational establishments)</p>
Low	Receptor is tolerant of change without detriment to its character or is of low or local importance.	<p>River Huntspill (WFD Chemical Status Fail)</p> <p>Acid Ditch (viewed rhyne) (Poor water quality)</p> <p>Groundwater (very low permeability)</p> <p>Proposed Development defined in NPPF Flood Risk Vulnerability Classification as “Less Vulnerable” (i.e. restaurants/cafes, shops, leisure facilities, general industry, storage and distribution)</p>
Negligible	Receptor is not sensitive to impact or risk.	Proposed Development defined in NPPF Flood Risk Vulnerability Classification as “Water Compatible” (i.e. water/sewer transmission infrastructure and pumping station(s), amenity open space, nature conservation, biodiversity).

Table 13.1: Water Environment Summary of Sensitive Receptors

Assessment of Significance

13.4.12 The magnitude of impact takes into account the timing, scale, size and duration of the impact. For the purposes of this assessment, the significance level criteria are defined as follows in Table 13.2.

	Significance Level Criteria	Characteristics of Change
	Large	<p>Major changes to the regional hydrological regime.</p> <p>Pollution of potable sources of water abstraction.</p> <p>Major changes in volume and/or peak discharge of surface water runoff from the Site.</p> <p>Major changes in surface water quality.</p> <p>Major changes to flow conveyance and floodplain storage.</p>
	Medium	<p>Moderate changes to the local hydrological regime.</p> <p>Moderate changes in volume and/or peak discharge of surface water runoff from the Site.</p> <p>Moderate changes in surface water quality.</p> <p>Moderate changes to flow conveyance and floodplain storage.</p>

	Significance Level Criteria	Characteristics of Change
	Small	Some noticeable changes to the local hydrological regime. Some noticeable changes in volume and/or peak discharge of surface water runoff from the Site. Some noticeable changes in surface water quality. Some noticeable changes to flow conveyance and floodplain storage.
	Negligible or No Effect	No noticeable changes to the local hydrological regime. No noticeable change in volume and/or peak discharge of surface water runoff from the Site. No noticeable changes in surface water quality. No noticeable changes to flow conveyance and floodplain storage.

Table 13.2: Magnitude of Impact

13.4.13 The likely significance of an effect is derived based upon the sensitivity of the receptor and the magnitude of the change. The significance of the effect is then determined using the matrix presented at Table 13.3 below. The likely significance of an effect can be beneficial, neutral or adverse. The significance of an effect has also considered the likelihood of an impact occurring (using a scale of certain, likely or unlikely) and the confidence in the accuracy of the assessment.

Magnitude	Sensitivity			
	High	Medium	Low	Negligible
Large	Significant	Major	Moderate	Negligible
Medium	Major	Moderate	Moderate	Negligible
Small	Moderate	Moderate	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Table 13.3: Flood Risk & Drainage Impact Significance

13.4.14 Temporary impacts are considered to occur in the demolition/construction phase and permanent impacts in the post-completion operational phase (albeit that the impact may first occur during construction e.g. change of surface material).

13.4.15 The likely significance of residual impacts (i.e. the environment impacts that remain after the incorporation of mitigation measures) has been assessed through consideration of their magnitude, duration and nature (i.e. reversible or irreversible) and also the geographic context (e.g. highly localised or widespread). The significance criteria are set out in Table 13.3 above. In the absence of 'industry standard' significance criteria for the consideration of flood risk and drainage impacts, a qualitative approach, based upon available knowledge, experience and professional judgement is employed.

Limitations

13.4.16 Assessment of flood risk and drainage at the Site and the Proposed Development is based on the most up to date available data, which is included in the FRA ([Appendix 13.1](#)) and SWDS ([Appendix 13.2](#)) that supports this chapter.

- 13.4.17 In the absence of observed/recorded gauge data for watercourses on the Site, the hydraulic model used to assess floodplain extents is not calibrated and is therefore based upon a number of assumed parameters. As a result, there is a degree of uncertainty associated with the design flood levels. However, the modelling analysis has been undertaken in accordance with guidelines set out by the EA and using industry-standard methods. In addition, model sensitivity testing has been undertaken to understand the potential impact upon design flood levels caused by variation of model input parameters. On this basis, the flood levels estimated using the model are considered to be sufficiently robust to inform the FRA and preparation of this chapter of the ES.
- 13.4.18 As the 2032 baseline lies within the future at the time of preparing this chapter, there is a limitation regarding the prediction of the water environment at this time.
- 13.4.19 In the context of the LDO, water quality sampling has not been undertaken. The assessment is based on a combination of qualitative professional judgement and quantitative data and consultation with relevant statutory and non-statutory organisations.

13.5 Baseline Conditions

Current State of the Environment

Surface Water Bodies

- 13.5.1 In common with much of this area of Somerset, the Site is crossed by rhynes (ditches). These provide the existing surface water drainage on Site, eventually discharging into the Huntspill River to the north. Some of these rhynes pass through the Site, conveying flows from the upstream catchment, whilst the rhynes on site discharge into these. Within a spur from the main section of the Site to the Huntspill River is a large system of reed beds which historically provided treatment for the process effluent from the former ROF. However, following cessation of operations within the ROF site effluent is no longer discharged into the onsite rhynes, ditches or reed beds.
- 13.5.2 A section of the Huntspill River lies within the Study Area. The Huntspill River is essentially a large reservoir constructed to provide a water supply to the former ROF. As such, water levels are managed to be 3.5mAOD in the summer and 2.9mAOD in the winter.
- 13.5.3 All watercourses within the Study Area form part of the North and Mid Somerset Catchment Flood Management Plan (CFMP) (EA, 2012) and South West River Basin Management Plan (RBMP) (EA, 2015).

Environmental Designations and Water Framework Classifications

- 13.5.4 The section the Huntspill River that falls within the Site measures c.0.7ha. This section of the Huntspill River is part of the overall Huntspill National Nature Reserve (NNR). The NNR holds a large stock of coarse fish, is home to otters and is a breeding area for barn owls.
- 13.5.5 The Huntspill River, approximately 5km downstream of the Site, flows into the Bridgwater Bay NNR and Site of Special Scientific Interest (SSSI), and Severn Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site. The NNR is an internationally important feeding and roosting site for many waterfowl and wading birds. It is also designated as a SSSI as it comprises a succession of habitats ranging through extensive intertidal mudflats, saltmarsh, shingle beach and grazing marsh intersected by a complex network of freshwater and brackish ditches that support the internationally important waterfowl and waders.
- 13.5.6 The quality of the Huntspill River is monitored by the EA against the objectives of the Water Framework Directive (WFD). At the Site, the nearest WFD designated water body is the Huntspill (GB108052021210). This is currently classified as overall Moderate status,

with Moderate ecological status and Fail chemical Status (Cycle 2, 2019). The Site does not currently lie within a WFD groundwater management catchment and therefore no status is provided regarding groundwater.

Existing Drainage

- 13.5.7 Five surface water drainage catchments were identified on site as part of the work to support the Extant Consent. The majority of the western parts of the Site drained to the “Site Acid Ditch”, although a small section of land on western boundary and another, north-west of centre, discharges into the “Black Ditch” which flows westwards before discharging into the Huntspill River. Central areas of the Site drain to a south-to-north rhyne which continues parallel to (but separate from) the reed beds before discharging into the Huntspill River via the “North Water Outfall”. Eastern parts of the Site drain north-eastwards to the Stoning Pound Rhyne which ultimately discharges to the Huntspill River. These catchments remain unchanged at present.
- 13.5.8 While the ROF was operational, effluent was piped or pumped to a large treatment tank in the centre of the Site, known as the “Lido”, and then pumped to the reed beds. The Lido also has an overflow to the Site Acid Ditch. Following passage through the reed beds, treated effluent was pumped into a ditch immediately to the north, which runs west and flows parallel to (but separate from) the Huntspill River and discharges into the Parrett Estuary. This ditch is referred to as the “Acid Ditch”. The Lido and overflow are still in-situ but owing to the ceasing of operations on site, no longer receives effluent discharge, therefore no effluent is discharged into either the Site Acid Ditch or the Acid Ditch and these are now surface water only systems.
- 13.5.9 The Site Acid Ditch, reed beds and North Water Outfall lie within the Site, whilst the Black Ditch lies on the northern boundary. The Acid Ditch does not lie within the Site.
- 13.5.10 Consultation with the EA and Somerset Drainage Boards Consortium prior to determination of the 2017 Planning Consent indicated that both parties sought to amend the existing surface water outfall arrangement. It was requested that surface water runoff should be directed through the reed beds and then into the Huntspill River via the North Water Outfall. However, a sweetening flow would need to be preserved in the Acid Ditch to preserve the existing water vole habitat. This has not yet been implemented and in the context of the LDO the water vole are proposed to be translocated. The principle forms the basis of any proposed surface water management for the LDO and will represent an alteration to the catchments serving each of the defined outfalls from Site.
- 13.5.11 Following remediation, the existing surface water drainage regime has not been altered from the five catchments identified previously i.e. there has been no removal of rhynes or ditches, no realignment of rhynes or ditches and no new culverts installed.
- 13.5.12 The existing drainage regime is indicated within **Appendix 13.4** (drawing 332510102/4002/003). Any changes to are presented later in this chapter and in the SWDS (**Appendix 13.2**).

Surface water Abstractions

- 13.5.13 The Site currently benefits from two surface water abstraction licences that previously served the ROF. One relates to abstraction from the Huntspill River (licence number 16/52/011/048) at a location adjacent to Woolavington Bridge on Woolavington Causeway, the second from the King's Sedgemoor Drain (licence number 16/52/008/S/122) approximately 2km south of the Site.
- 13.5.14 These licences were issued by the EA and no expiry dates have been identified, both stating that they “shall remain in force until revoked”. The purpose of the abstractions is for industrial use and authorised at specific locations on site. There are no seasonal restrictions for these abstractions.

- 13.5.15 Whilst the licences are for separate surface water bodies and operable independently, Clause 7.2 of the licences defines a maximum aggregate quantity of abstraction from the two sources. The maximum hourly rate of abstraction is not limited, but maximum aggregate abstraction quantities of 6,500m³/day and 1,000,000m³/year apply to both licences.
- 13.5.16 The licence for abstraction from the Huntspill River defines clearly that abstraction can only be undertaken when the water level in the river, as measured at the gauge board adjacent to Gold Corner, is above 2.2mAOD. This is below the maintained (winter) water level of 2.9mAOD, thus abstractions are achievable through the year.
- 13.5.17 However, the licence for the King's Sedgemoor Drain states that the EA have the right, in the event of a prolonged period of dry weather, to reduce or stop abstraction in the event that the retained water level falls below that necessary for agricultural purposes as agreed between the EA and the Somerset Drainage Boards Consortium or the flow to the tidal estuary over the weirs at Dunball Clyce ceases. The water level necessary for agricultural purposes is open to variation.

Groundwater Bodies

Geology

- 13.5.18 Review of British Geological Survey (BGS, 2021 online viewer) mapping indicates that the Site is underlain by bedrock geology of the Langport Member, Blue Lias Formation and Charmouth Mudstone Formation (undifferentiated), which are describe as “porcellanous limestone below, calcareous mudstone above”, “thinly interbedded limestone (laminated, nodular or massive and persistent) and calcareous mudstone or siltstone (local laminated)” and “dark grey laminated shales, and dark, pale bluish grey mudstone” respectively. The BGS online viewer also indicates that the Charmouth Mudstone Formation and Langport Member form the upper and lower boundaries to the Blue Lias Formation respectively.
- 13.5.19 Superficial deposits are indicated to be Tidal Flat Deposits, comprising clay, silt and sand, for the majority of the Study Area. Higher elevations in the southern part of the Study Area do not have superficial deposits recorded.

Hydrogeology

- 13.5.20 A review of EA mapping (DEFRA, 2021) indicates that the bedrock geology underneath the Site is a Secondary A Aquifer. A Secondary A Aquifer is defined by the EA as “permeable layer capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of baseflow to rivers”.
- 13.5.21 The Tidal Flat Deposits are classified as a Secondary (undifferentiated) Aquifer by the EA (DEFRA, 2021). A Secondary (undifferentiated) Aquifer is defined as “where it has not been possible to attribute either category A or B”.
- 13.5.22 The Site lies within a Groundwater Vulnerability Zone of ‘Medium – High’ (DEFRA, 2021). ‘Medium’ vulnerability is defined as “areas that offer some groundwater protection”, whilst ‘High’ is defined as “areas able to easily transmit pollution to groundwater... characterised by high leaching soils and the absence of low permeability superficial deposits”.

Groundwater Abstractions

- 13.5.23 Review of the Environment Agency Source Protection Zone (SPZ) map (DEFRA, 2021) shows that the Study Area does not cover any areas indicated as a SPZ.
- 13.5.24 Information regarding licensed and non-licensed groundwater abstractions has been obtained through consultation with the EA and Somerset County Council during preparation of the ES.

Flood Risk

Fluvial and Tidal

- 13.5.25 The TUFLOW modelling reports and Flood Risk Assessments completed as part of the works completed to date (see paragraph 13.4.3) made several assessments of the tidal flood risk, taking account of a potential breach of the existing defences.
- 13.5.26 The July 2007 TUFLOW modelling report assessed the five flood defence scenarios and determined the following:
- The existing tidal defences provide a 1 in 200 year level of protection from extreme tidal events, except for a few minor places where limited overtopping occurs.
 - The present-day 1 in 1,000 year extreme tidal event overtops the defences, but the floodwater is contained within the low lying area next to the defences.
 - Allowing for sea level rise as a result of climate change would result in more extensive flooding. The road, railway and motorway to the west of the Site provide a significant barrier to inland flow. The ROF site is not affected by tidal flooding, even including for climate change.
 - Breaching of the tidal defences would result in more extensive flooding, but the analysis has demonstrated that floodwater would still not reach the Site, even allowing for climate change up to the year 2070.
- 13.5.27 In October 2007, the EA requested that additional modelling was undertaken for the 1 in 1,000 year (0.1% AEP) extreme tidal level for both present-day and with climate change at the breach location where the most extensive flooding was previously generated. The conclusion remained the same, that the Site would not experience tidal flooding in this scenario.
- 13.5.28 In January 2008, the modelling was updated to account for potential residential development at the Site. This meant that the development would have a longer design life and therefore the climate change allowances applied needed to be amended. The results show that during the 2110 climate change scenario for the 1 in 200 year event, flooding occurs in the northeast corner of the Site. The 1 in 1,000 year event results in flooding from the northeast of the Site and from the low-lying lands to the west of the Site.
- 13.5.29 By the time of the October 2011 remediation application Flood Risk Assessment, climate change allowances had been updated. The modelling assessment was updated to account for these as well as increasing the defence breach width from 40m to 50m. The results confirmed that floodwater will not reach the Site during a breach of the tidal defences coincident with a 1,000-year tide during the period of the remediation works.
- 13.5.30 This assessment was repeated for the April 2013 Flood Risk Assessment supporting the Extant Consent on site. The results confirm that during the present-day scenario, floodwater will not reach the Site during a breach of the tidal defences coincident with a 1 in 200 year tide. The TUFLOW model was re-run to consider the predicted effects of climate change up to the year 2075. The modelled results for the 1 in 200 year breach scenario show no floodwater reaching the Site due to the natural protection of the local topography. The modelled results for the predicted 1 in 1,000 year overtopping scenario for the year 2075 show some shallow flooding beginning to encroach into the north-east corner of the Site with a peak water level of 5.06m AOD.
- 13.5.31 Since the aforementioned works were undertaken, the EA climate change guidance for sea level rise has been updated (Full details provided in FRA, Appendix 13.1). An updated assessment has been completed regarding the existing tidal flood risk onsite using these updated climate change allowances.

- 13.5.32 The present day model extents for the 1 in 200yr 2021 Higher Central (Defended and Breach), as well as the 1 in 200yr 2021 Upper End (Defended and Breach) scenarios show no flood extents within the LDO boundary.
- 13.5.33 The PPG 'Flood Risk and Coastal Change' (Paragraph 026 Reference ID: 7-026-20140306) outlines that the lifetime of residential development should be considered as 100 years. For this assessment the design life of commercial and other less vulnerable development is considered to be 70years. As a worst case scenario, the lifetime of development has been considered post estimated completed construction which is anticipated to be 2032.
- 13.5.34 Pre-development scenarios (assuming no development) have been modelled based on the ground levels within the baseline model. Post-development scenarios (assuming the site is developed as proposed) have been assessed based on the ground levels proposed in LDO parameters plans of land uses and building heights. It is recommended that additional post-development modelling in undertaken at detailed design stages to ensure any flood resilient and resistant measures are designed to a suitable level.
- 13.5.35 In the pre-development 2102 design scenario (commercial), flood extents begin to the encroach on the north east and north west fringes. In all pre-development scenarios, the southern portion of the LDO boundary remains dry. For this development type, the FFLs should be set above the 1 in 200 year 2102 Upper End Breach flood level with suitable freeboard, as to provide appropriate mitigation
- 13.5.36 The LDO parameters plans indicate that parts of the southern portion of the site (south of the original ROF boundary) could contain residential dwellings and educational uses, which are considered to be more vulnerable development. Given the development type, the design life is 100 years from 2032. As outlined by the buildings heights plan, the LDO has visual impact constraints meaning that any development south of the original ROF boundary cannot be raised higher than 6.5mAOD. Therefore, post-development scenarios have been assessed based on the ground levels proposed in LDO parameters plans of land uses and building heights.
- 13.5.37 Through the pre-development 2132 design scenario (residential), the extents follow a similar trend of encroaching from the north, east and west of the LDO boundary. In all pre-development scenarios, the south of the LDO remains dry. For this development type, the FFLs should be set above the 1 in 200 year 2132 Upper End Breach flood level with suitable freeboard in addition to the sequential approach being applied to situate more vulnerable classes outside any modelled extents, as to provide appropriate mitigation
- 13.5.38 The 1 in 200 year 2100 H++, defended and breach, scenario has been assessed as a sensitivity test. Due to the extreme nature of the event there is by definition more extensive flooding. In the H++ scenarios, the southern portion of the LDO boundary remains dry.
- 13.5.39 Modelled extents are provided in the FRA Appendix 13.1.

Flood Risk Mapping

- 13.5.40 Notwithstanding the above, The EA Flood Map for Planning (EA, 2021a) indicates that the majority of the Site is designated as Flood Zone 3, which is defined as land with a 1 in 100 or greater annual probability of fluvial flooding (>1% Annual Exceedance Probability (AEP)) or with a 1 in 200 or greater annual probability of tidal flooding (>0.5% AEP)). The source of this flood risk is identified in the works completed to date as being tidal and not fluvial and does not take account of any existing defences which the Site is indicated to benefit from (as described in detail above). These defences are indicated to be embankments along the River Parrett to the west of the Site.
- 13.5.41 Areas of Flood Zone 2 are indicated towards the southern part of the Site, where on site levels begin to rise towards the Polden Hills. The extents of Flood Zone 2 extend slightly

further than that of Flood Zone 3. The Flood Zone 2 extents are again indicated to be tidally influenced rather than fluvial and they are defined as land having between a 1 in 200 and 1 in 1,000 annual probability of tidal flooding (0.1-0.5% AEP).

13.5.42 Further south and at higher elevation, the remaining land within the Site is indicated to lie within Flood Zone 1. This is defined as land having a less than 1 in 1,000 annual probability of tidal flooding (<0.1% AEP).

13.5.43 The Site is located approximately 5km inland from the Parrett Estuary. Between the estuary, the flood defences and the Site, there are three arterial transport routes (the A38, the Taunton to Bristol railway line and the M5 motorway) each constructed on raised embankments above general levels. These will, therefore, serve to impede the propagation of tidal floodwaters and reduce tidal flood risk on Site. Investment in water management and strengthening defences is an ongoing priority for the Council and the EA and the Parrett Barrier project will see further investment into the locality to ensure a sustainable future.

13.5.44 High water levels within the Huntspill River as a result of tidal flooding could have the potential impact of “tidelocking” the existing rhynes and ditches draining the Site and could generate flooding on Site works completed to date indicates that in this scenario, the proposed surface water management strategy together with the raised embankment surrounding the existing reed beds provides for sufficient temporary storage capacity to prevent flooding on the Site prior to discharging as tidal water levels recede within the Huntspill River. The reed bed system is currently undergoing maintenance.

Surface Water (Pluvial)

13.5.45 The Risk of Flooding from Surface Water (RoFSW) map (EA, 2021b) details that the Study Area is predominantly within an area at very low risk (<0.1% AEP) of surface water flooding.

13.5.46 The RoFSW map identifies that some areas in the southeast of the Site have a high risk (>3.3% AEP) of surface water flooding, but these appear to be associated with areas immediately upslope from buildings on site. These buildings have been removed as part of the remediation of the Site, and thus this risk is likely to be reduced or removed. Other areas closely associated with existing drainage on site are indicated to have a low risk (between 0.1 and 1% AEP) of surface water flooding, but this likely reflects that these areas are localised depressions or channels.

Groundwater

13.5.47 The Sedgemoor District Council Strategic Flood Risk Assessment (SFRA) Level 1 mapping indicates that the site and surrounding area lie outside an area susceptible to groundwater flood emergence.

13.5.48 The North and Mid Somerset CFMP (EA, 2012) does not identify groundwater as being a significant source of flood risk.

Reservoir

13.5.49 The EA provides mapping that gives an indication of the areas at risk of flooding in the event of a reservoir failure (EA, 2021b). The Study Area is shown to be outside of flood extents due to this scenario.

Historic Flood Events

13.5.50 The Environment Agency’s Historic Flood Map (EA, 2021c) identifies the maximum extent of recorded flood outlines from rivers, the sea and groundwater springs.

13.5.51 The Sedgemoor District Council SFRA Level 1 (SDC, 2015) indicates a number of historic flood events, which are as follows:

- October/November 1960 – prolonged rainfall caused widespread flooding across the Levels and Moors.
- December 1981 – very high tidal levels resulted in overtopping of sea defences, inundating approximately 3,570ha.
- August 1997 – intense summer rainfall caused significant vegetation damage and pollution on the Levels and Moors.
- November 2012 – exceptionally high groundwater levels were observed on the Levels and Moors and surrounding villages. This was due to wetter than typical weather between April and October of that year. Up to 150mm fell across some areas through late November, leading to extensive flooding and road closures.
- December 2013 to February 2014 – heavy prolonged rainfall led to extensive flooding across the Levels and Moors affecting property and agricultural land. During January 2014, southern England experienced the highest rainfall since records began. The extent of flooding led to a major incident being declared by Somerset County Council.

13.5.52 The Environment Agency's 'Historic Flood Map' and 'Recorded Flood Outlines' identifies the maximum extent of recorded flood outlines from rivers, the sea and groundwater springs. A review of this mapping identifies there are three recorded historic flood events either within or close proximity of the site's north-western boundary (shown in FRA Appendix 13.1). The mapped extents indicate that an area of the north-west of the site, corresponding with the existing railway in the LDO boundary (outside the ROF fence), was affected by the December 1981 event. Mapping and anecdotal evidence from operatives on site indicates that it was unaffected in 2012 and 2013-2014, although the 2012 event did include minor flooding within the LDO boundary in the North West periphery (proposed as open space and biodiversity zone including rail line associated infrastructure).

2032 Baseline

13.5.53 In addition to the key data sources stated for the current state of the environment set out above, the following documents have also been used to inform a description of the water environment baseline conditions in 2032:

- Documents available for the 2017 Planning Consent; and
- Sedgemoor District Council (SDC, 2019) Local Plan 2011-2032.

13.5.54 Where the 2032 baseline condition remains unchanged from the current state of the environment, this is clearly set out.

Surface Water Bodies

13.5.55 The 2017 Planning Consent set out that the Site would continue to be drained by a number of rhynes and ditches. The layout and contributing areas of these rhynes and ditches would have been amended to enable the 2017 Planning Consent but would still ensure that any pre-development flows from off-site were accounted for.

13.5.56 Given the Site's location, it is unlikely that any development allocated within the SDC Local Plan would impact or amend Surface Water Bodies within the Study Area for the 2032 baseline condition.

13.5.57 Therefore, the 2032 baseline condition of Surface Water Bodies is considered to be the current state of the environment.

Environmental Designations and Water Framework Classifications

13.5.58 It is assumed that Environmental Designations for the 2032 baseline will remain the same as the current state of the environment.

13.5.59 The Huntspill (WFD designation GB108052021210) has an objective to be classified as overall Good status with Good ecological and chemical status by 2027 and will be likely subject to annual testing to monitor progress against achieving this. Reasons for not achieving Good status have been given as poor livestock management and physical modifications undertaken by agricultural/rural land management and local government activities.

13.5.60 It is not possible to predict the status of the Huntspill for the 2032 baseline, however for the purpose of the assessment assuming the Huntspill achieves Good status by 2027 and maintains that to 2032 would form the basis of a conservative approach to assessing impacts. This approach is based on the Proposed Development being designed to support the objective to improve the status of the Huntspill.

Existing Drainage

13.5.61 In the 2032 baseline, the existing drainage on-site will be as described in the Surface Water Management Strategy and Addendum reports provided as part of the 2017 Planning Consent.

13.5.62 This includes the amendments to the surface water outfall points, as described within the current state of the environment, and this amendment is therefore considered as part of the 2032 baseline.

13.5.63 In addition to the change of surface water outfalls, the 2017 Planning Consent Surface Water Management Strategy and Addendum reports state that the existing drainage in the 2032 baseline condition would comprise rhynes and ditches realigned in consideration of the development layout. There will also be additional water quality measures, such as SuDS, within the development plots themselves.

Surface Water Abstractions

13.5.64 In the 2032 baseline, the Site will still benefit from the existing surface water abstraction licences from the Huntspill River and King's Sedgemoor Drain. However, the 2017 Planning Consent was silent on these abstractions to supply non-potable water to the Site, therefore for the purpose of the 2032 baseline condition it will be assumed that abstractions from the Huntspill River or King's Sedgemoor Drain no longer take place, despite the licences still being valid.

13.5.65 Licencing is a parallel process to the planning consent process and will be considered by the EA. Infrastructure to ensure adequate water management to meet occupier needs is a potential candidate scheme for the locality investment plan.

Groundwater Bodies

Geology

13.5.66 The geology of the Site for the 2032 baseline will remain unchanged and the same as the current state of the environment.

Hydrogeology

13.5.67 It assumed that the hydrogeology of the Site for the 2032 baseline will remain as per the same as the current state of the environment and that no DEFRA or EA designations have changed.

Groundwater Abstractions

13.5.68 It is assumed that the Site will not be designated as a Source Protection Zone (SPZ) prior to 2032 based on Site and study area is currently not being designated.

Flood Risk

Fluvial and Tidal

13.5.69 The PPG indicates the anticipated sea level rise that will occur between 2021 and 2032.

13.5.70 Utilising the recommended sea level rise allowances within the PPG, likely impact sea level rise will have on the Site for the 2032 baseline scenario is estimated to be minimal. Therefore, it is proposed that the current tidal flood risk will remain the same in the 2032 baseline.

Flood Risk Mapping

13.5.71 The EA Flood Map for Planning (EA, 2021a) does not take account of the effects of climate change. However, as previously mentioned, flood risk on site is predominantly tidally influenced. Therefore, it is proposed that the current fluvial flood risk will remain the same in the 2032 baseline.

Surface Water (Pluvial)

13.5.72 The RofSW map (EA, 2021b) identifies areas at risk of surface water flooding based on the pre-remediation layout. However, the layout of the site for the 2032 baseline will be that of the 2017 Planning Consent. Owing to the planning requirement to implement a Surface Water Management Strategy to serve the development and manage rainfall on site, it is assumed that surface water flood risk on site for the 2032 baseline scenario will be very low (<0.1% AEP).

Groundwater

13.5.73 Given that the underlying geology and hydrogeology will remain unchanged when compared to the current state of the environment, it is also assumed that the groundwater flood risk in the 2032 baseline will remain the same.

Reservoir

13.5.74 It is assumed that for the 2032 baseline condition, flood risk from reservoirs is to remain unchanged from the current state of the environment.

Historic Flood Events

13.5.75 Given it will not be possible to assess historic flood events in the context of the 2032 baseline for the period between writing the ES in 2021 and 2032 itself, this aspect is not applicable for assessment.

13.6 Embedded Mitigation

- 13.6.1 The mitigation of potential impacts of the Proposed Development is principally based on the requirements set out in national planning policy and associated guidance.
- 13.6.1 A Framework Demolition and Construction Environmental Management Plan (FDCEMP) is submitted with the LDO which sets out embedded mitigation for the demolition/construction phase. The FDCEMP sets out a framework for pollution prevention measures to safeguard controlled waters from adverse quality effects during the construction phase. The introduction of contaminants into the local water system via surface water or groundwater will require careful management through the FDCEMP. All measures presented in the FDCEMP adhere to relevant EA pollution prevention measures. The FDCEMP is secured through the Compliance Form.
- 13.6.2 The potential phased development of the Site creates the potential for blockage of infrastructure built for earlier phases of the development. This will be mitigated through site management measures and potential temporary works outlined in the FDCEMP.
- 13.6.3 The FDCEMP will include a suitable drainage scheme to control surface water runoff during the Proposed Development construction phase, including provision for the installation of drainage and attenuation outfalls before construction of buildings and site infrastructure. This is to manage surface water runoff generated during Proposed Development construction so as not to increase flood risk downstream (outside the Site). The scheme will be designed to manage surface water effectively on Site. The scheme will also include measures for managing silt that may be generated during the Proposed Development construction activities (including wheel-washing, should it be required).
- 13.6.4 The implementation of the FDCEMP will be adopted to manage the construction process, minimise the risk of a pollution incident during the construction works, and thus mitigating the potential for adverse effects upon the groundwater bodies.
- 13.6.5 As summarised below, embedded mitigation measures have been defined by the FRA and SWDS to mitigate flood risk and surface impacts in the operational phase of development.

Flood Risk

- 13.6.6 In accordance with the NPPF and PPG, all built development is located in a compatible flood risk area defined by the flood risk vulnerability (detailed in the FRA, **Appendix 13.1**). This is effective inherent mitigation against flood risk. This is secured within the Compliance Form.

Surface Water Drainage

- 13.6.7 The proposals include a surface water management strategy to control outflows to receiving systems and manage surface water sustainably within the Site. The proposed surface water management strategy is detailed in the SWDS (**Appendix 13.2**), the strategy replicates the approach adopted by the 2017 Planning Consent. The key aspects of the strategy can be summarised as follows:
- The underlying geology has been identified as having low permeability potential. In addition, groundwater monitoring undertaken between 2006 and 2010 has indicated that groundwater levels on site are on average 1.5m below ground levels, although in some areas of the site it was less than 1m. Therefore, infiltration as a means of surface water discharge on site is not feasible.
 - Maintaining the strategy set out in the Works Completed to Date, surface water runoff from the site will be discharged directly into the Huntspill River via the existing reed beds. This requires an amendment to the existing outfall arrangements whereby surface water is

discharged via ditch parallel to but separate from the reed beds. The reed beds will no longer be required for effluent treatment so this will be a completely surface water system.

- A free discharge from the site into the Huntspill River will be maintained, therefore there are no discharge restrictions required on site. The reed beds have been assessed regarding their capacity to temporarily store surface water runoff in the event of “tide locking” from the Huntspill River and adequate provision exists.
- On site, surface water runoff will be conveyed utilising the existing rhyne and ditch network where possible. Where this is not possible, or the existing network clashes with the Proposed Development, these rhynes and ditches will be realigned or diverted to accommodate the proposals. These amended rhynes and ditches will also continue to manage runoff generated upstream of the site’s boundary that is currently managed by the existing system.
- The rhynes/ditches and reed beds will be sufficient to treat surface water runoff prior to discharge from the site, although it is recommended that this system is augmented with additional on-plot SuDS i.e. upstream of the rhynes. These will better mimic natural processes and the existing drainage regime on site.
- The surface water drainage system on site will be designed to manage runoff up to the 1 in 100 year storm event, plus a 40% increase in peak rainfall intensity to account for the likely effects of climate change.

13.6.8 This is secured within the Compliance Form.

13.7 Assessment of Likely Significant Effects

Demolition and Construction

Surface Water Bodies

- 13.7.1 Risks to water quality during construction originate from two sources; potentially polluting materials brought to Site for use during construction, or materials already within the Site such as the mobilisation of sediment or exposure of contaminated material, though this risk is low given the site is already fully remediated.
- 13.7.2 During the demolition and construction phase, potential contamination of surface water could arise from the spillage of chemicals, fuels and cement from construction activities and the movement of materials and machinery within the Site. If not managed effectively, these contaminants could be washed away in surface water runoff into the on-site rhyne/ditch network and ultimately the Huntspill.
- 13.7.3 The effect experienced during the construction phase has the potential to have a temporary moderate adverse effect on the Huntspill (considered to be a low sensitivity receptor) and/or the Acid Ditch (low sensitivity receptor), due to the proximity of the works to these watercourses and volume of construction activity being carried out. The introduction of contaminants into the local water system via surface water will however be managed effectively through a FDCEMP to limit this potential effect to negligible.
- 13.7.4 With a comprehensive FDCEMP and its effective implementation in place the effect of construction works on water quality is expected to be negligible.

Groundwater Bodies

- 13.7.5 Construction may involve the delivery, use and storage of hydrocarbons and other chemicals. Accidental spillages of hydrocarbons or other chemicals in any areas of the Site could lead to pollution via contaminated groundwater and therefore there is considered

to be a temporary minor adverse effect. This is anticipated to have a negligible effect on groundwater, if managed using appropriate techniques and measures included in the FDCEMP.

- 13.7.6 The Site will require de-watering during the construction phase to remove groundwater ingress into any deep excavations. Standard best-practice measures will be implemented during construction to control this risk, before discharging any water to the local storm water system or back into the water environment. This is anticipated to have a negligible effect on groundwater, such as increased flows through de-watering, if managed using appropriate techniques and measures included in the FDCEMP.

Flood Risk

- 13.7.7 Any temporary construction works could reduce the available storage volume in the locality, increasing the risk of flooding upstream or downstream of the Site and as such there is a likely temporary moderate adverse effect to existing properties upstream/downstream of the Site during construction.
- 13.7.8 During construction of the Proposed Development, the impermeable area of the Site will increase without mitigation. This has the potential to increase the likelihood of surface water flooding within the Site or outside the Site until the permanent drainage system is operational. This is considered to be a temporary minor adverse effect.
- 13.7.9 All construction sites have the potential to increase surface water runoff rates and volumes, alter drainage patterns and affect local and catchment wide flood risk. However given the scale of the site, there is a sufficient flexibility to manage surface water on site. Key potential increases in surface water flood risk from construction activities could include:
- Alteration to the rate and route of surface water runoff in temporary drains while the operational surface water drainage system is being constructed;
 - Stripping of soil or the import of fill affecting surface water runoff potential and drainage patterns through the compaction and smearing of soils; and /or
 - Alteration to the surface water runoff regime through reprofiling of the ground surface and by the introduction of temporary drainage channels.
- 13.7.10 Therefore, there is a temporary minor adverse impact on the surface water runoff from the Site during the construction phase.
- 13.7.11 The risk of groundwater flooding to the Site and surrounding area during the construction phase is negligible as de-watering will be carried out when required by over-pumping, as described above (Section 13.7.5 and 13.7.6).
- 13.7.12 Modelling indicates the Site lies outside the 1 in 200 year 2102 Higher Central design event. By definition an event greater than this during the construction phase is low. There will be a Flood Emergency Plan and there are also EA flood warning and alerts available for the Site, secured in the FDCEMP. Given the low probability of flood event, the effect of tidal flood risk on the construction site including personnel will be negligible during the construction phase.

Operation

Surface Water Bodies

- 13.7.13 The Proposed Development's surface water drainage will mimic the existing conditions of the Site by utilising a modified rhyne/ditch system, including the Acid Ditch and Huntspill to manage runoff. The rhynes and ditches will be amended to accommodate the Proposed Development whilst still providing the same storm water storage volume and conveyance

as prior to development. The Proposed Development would therefore not directly alter any sensitive surface water body receptors. The direct effects on surface water features would be negligible.

- 13.7.14 The increase in impermeable area will lead to an increase in the risk of contamination of surface runoff due to accidental spillage of contaminants and from flushing of pollutants from impermeable surfaces. Contaminated surface runoff could enter and pollute the nearby watercourse via overland flows.
- 13.7.15 The quality of surface water runoff generated by residential development is generally reasonable as much of it will arise from falling on roofs of buildings and the hardstanding areas. The greatest risk lies with the possibility of hydrocarbon spillages from the movement and parking of vehicles and from residents disposing of chemicals into the drainage system.
- 13.7.16 Therefore, without the inclusion of mitigation measures there could be a minor adverse impact at the occupation stage. However, the embedded mitigation measures discussed previously in Section 13.6 will provide a level of surface water quality treatment through a number of processes. In addition, the transport strategy on site focuses on reducing the need to travel, and prioritise alternative modes other than the car, and the shift to EV, reduces the potential of this impact.
- 13.7.17 Considering the embedded mitigation measures proposed there will be a negligible impact, potential for minor beneficial, at the occupation stage.
- 13.7.18 As a result of the Proposed Development changes to existing land uses and permanent residences there is a resulting nutrient loading (phosphorus). The outcome of the NNS (**Appendix 13.3**), including consultation with Natural England, consider the Proposed Development to pose a negligible effect on nutrient loading.

Groundwater Bodies

- 13.7.19 The drainage from Proposed Development roads, commercial operations and housing is likely to contain contaminants from vehicles such as hydro-carbons, dissolved heavy metals, rubber and paint. After heavy rainfall, these contaminants could have a permanent moderate adverse effect on water quality within the receiving groundwater both on and outside the Site.
- 13.7.20 There is potential for spillage or disposal of chemicals in any areas of the Site to lead to pollution via contaminated groundwater. However, this is considered unlikely to occur. Therefore the effect is considered to be permanent minor adverse.

Flood Risk

- 13.7.21 The flood risk onsite is considered to be tidal. Therefore, it can be assumed that the likely impact on available flood water storage, as a result of raised plot levels, would have negligible impact on tidal flood risk.
- 13.7.22 The flood risk to the development has been managed through by applying the sequential approach across the site and using the most recent climate change information to development an appropriate flood mitigation strategy, both outlined in the FRA (Appendix 13.1).
- 13.7.23 The Proposed Development will result in a significant change in the amount of impermeable surfacing across the Site. This could, without mitigation, result in an increase in surface water runoff entering the receiving watercourses, and potentially adversely affecting the surface water flood risk in the area or increasing flows in the receiving systems, and therefore affecting flood risk on the Site or outside the Site. This is

considered to be a permanent moderate adverse effect and is addressed through the approach proposed to design and surface water management.

- 13.7.24 Without mitigation, any works on the site including those associated with infrastructure and new crossings over rhynes and ditches could cause an impact whereby the available water storage volume is reduced, which could increase the risk of flooding upstream or downstream of the Site. This may result in a temporary moderate adverse effect. However this is not the proposed approach.
- 13.7.25 As set out above and in Section 13.6, embedded mitigation measures have been designed in to the development to mitigate flood risk to an appropriate level. This is captured in the design code. It is proposed that all development will be located at the appropriate level of vulnerability (as defined by the PPG) to be compatible with the level of flood risk. There is a risk of flooding in the event of blockage or in the event of exceeding the design event, but the inherent freeboard will reduce the risk of these potential impacts.
- 13.7.26 Therefore, with embedded mitigation measures it is considered to be negligible impact on flood risk.

13.8 Further Mitigation

Demolition and Construction

- 13.8.1 During construction, the use of best practice construction techniques (such as CIRIA publication C753 the SuDS Manual design code, and the implementation of the FDCEMP (see Embedded Mitigation Section 13.6) will be adopted to manage the construction process, minimise the risk of a pollution incident, silt-laden runoff, or blockage of channels during the construction works, and thus mitigating the potential for adverse effects upon the surface water bodies.
- 13.8.2 The construction of the SuDS should occur before the Proposed Development to mitigate fluvial flooding impacts for the construction of the Site. Alternatively, temporary works (surface water storage) could be installed as mitigation if this is not possible. Site management procedures in the FDCEMP would also mitigate any impacts.
- 13.8.3 A Flood Evacuation Plan and site management procedures in the FDCEMP (i.e. ensure no storing of plant or materials in Flood Zone 3 etc.) will be provided to construction workers by each occupier.

Operation

- 13.8.4 The overall SWDS for the site has been developed in accordance with stakeholder and policy requirements and mimics the existing surface water flow regime. Ongoing management and maintenance of the proposed surface water management systems must be undertaken to maintain appropriate treatment of surface water runoff.

13.9 Residual Effects

Demolition and Construction

- 13.9.1 No residual effects upon surface water bodies or with respect to groundwater, flood risk or drainage are anticipated on Site or surrounding area due to the employment of the mitigation measures to be included in the FDCEMP.

Operation

- 13.9.2 The successful implementation of the mitigation measures should result in no residual effects with respect to hydrology, flood risk or drainage.

- 13.9.3 From the post-development modelled extents, the residual risk offsite has been considered. The post development modelling is based on the worst case scenario and show negligible impact off site. It is recommended that additional post-development modelling is undertaken at detailed design stages to ensure appropriate flood resilient and resistant measures are in place.

13.10 Monitoring

- 13.10.1 There are no significant residual effects identified for the water environment and therefore monitoring is not required.

13.11 Cumulative Effect

- 13.11.1 In accordance with national policy, other committed development schemes within the area will be required to incorporate measures to ensure that additional development does not have an adverse impact on flood risk or drainage, to both internal (on site) and external (off site) receptors. On this basis, these schemes will not increase flood risk to external receptors and therefore other developments.
- 13.11.2 On this basis, there will be no cumulative effects within the local area (outside of the Site) and the catchment of the Huntspill River

13.12 Summary

- 13.12.1 This section summarises the likely significant effects of the Proposed Development in terms of water resources and flood risk, in particular water quality, groundwater, surface water drainage and flood risk.
- 13.12.2 The Proposed Development has been designed using the sequential approach of locating all built development in a compatible flood risk by the flood risk vulnerability defined in the NPPF and PPG.
- 13.12.3 As set out in Section 13.6, embedded mitigation measures have been designed-in to the development to mitigate flood risk to an appropriate level. The risk of flooding is considered to be negligible.
- 13.12.4 Of the environmental effects assessed for the Proposed Development, surface water quality and surface water drainage impacts are the most likely adverse effects to the environment if no surface water attenuation and/or treatment is provided. However, a sustainable surface water management strategy has been outlined as part of the Proposed Development and has been developed in accordance with stakeholder and policy requirements and mimics the existing surface water flow regime.
- 13.12.5 Additional mitigation measures in the form of a comprehensive SWDS will be provided, allowing sedimentation to occur leading to an improvement in water quality entering the downstream systems.
- 13.12.6 During construction, the use of best practice construction techniques and the implementation of a FDCEMP will be adopted to manage the construction process, minimise the risk of a pollution incident, silt-laden runoff, or blockage of channels during the construction works, and thus mitigating the potential for adverse effects upon the water environment.

13.13 Referencing

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14 Landscape and Visual

- 14.1.1 This Chapter has been prepared by The Richards Partnership. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.

14.2 Introduction

- 14.2.1 This chapter considers the likely significant landscape and visual effects of the Proposed Development and is referred to as the Landscape and Visual Impact Assessment (LVIA).
- 14.2.2 It should be noted that ‘impacts’ in the context of the EIA Regulations refer to beneficial as well as adverse effects.
- 14.2.3 The landscape and visual impacts referred to in this chapter are assessed separately in accordance with good practice¹. They may be defined as follows:
- Landscape character; impacts on the landscape or townscape may arise where the character of areas with a particular scenic quality or merit are modified by the development.
 - Landscape features; impacts on landscape features such as hedgerows, trees or landform may arise where features are lost or substantially modified as a result of the development.
 - Visual amenity; impacts on visual amenity may arise where features intrude into or obstruct the views of people, or where there is some other qualitative change to the view seen as a result of the Proposed Development.
- 14.2.4 The landscape and visual assessment was carried out through a desk study of relevant documents and by field study work undertaken from February to April 2021. The purpose of the site visits were to establish:
- The content and quality of the Site’s existing landscape features;
 - The character of the Site and its immediate environs;
 - The Site’s visual relationship with its surroundings;
 - The contribution of the Site to the wider landscape; and
 - The people most likely to be affected by development on all or part of the Site.
- 14.2.5 The following is a list of the appendices that accompany this chapter:
- **Appendix 14.1** Figures
 - **Appendix 14.2** Photomontage Methodology
 - **Appendix 14.3** Landscape and Visual Impact Assessment Tables

¹ Guidelines for Landscape and Visual Impact Assessment (3rd Edition) 2013 – Landscape Institute and Institute of Environmental Management and Assessment and An Approach to Landscape Character Assessment – October 2014, Christine Tudor, Natural England

- **Appendix 14.4** Arboricultural Survey/Arboricultural Impact Assessment (AIA)
- **Appendix 14.5** Lighting Assessment

14.2.6 The central part of the Site was formerly occupied by the ROF, and in 2017 Planning Consent was granted for Huntspill Energy Park which covers much of the Site extents. It should be noted that whilst the 2017 Planning Consent was granted, the safeguarded land uses were also considered and assessed cumulatively in the Environmental Statement. The safeguarded land uses included some very large scale industrial elements and stacks up to 105 metres high, and although these elements did not obtain planning permission at that time, they illustrate the intention that some large scale high elements could be considered.

14.3 Policy, Legislation, Guidance and Standards

National Planning Policy Framework (NPPF) July 2021

14.3.1 At the time of writing the NPPF has recently been updated. The revised framework places emphasis on the fostering of *“well designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs”* as part of the overarching social objective (section 2. para 8). The following paragraphs consider other extracts of pertinence to this chapter.

14.3.2 The NPPF (section 2. para 9) states:

“Planning policies and decisions should play an active role in guiding development towards sustainable solutions, but in doing so should take local circumstances into account, to reflect the character, needs and opportunities of each area.”

And goes on to state (section 3. para 20):

“Strategic policies should set out an overall strategy for the pattern, scale and quality of development, and make sufficient provision for [...]”

d) Conservation and enhancement of the natural, built and historic environment, including landscapes and green infrastructure, and planning measures to address climate change mitigation and adaptation.”

14.3.3 The NPPF Section 12: Achieving Well Designed Places (para 130) states that:

“Planning policies and decisions should ensure that developments:

a) Will function well and add to the overall quality of the area, not just for the short term but for the lifetime of the development;

b) Are visually attractive as a result of good architecture, layout and appropriate and effective landscaping;

c) Are sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities);

d) Establish or maintain a strong sense of place, using the arrangement of the streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit;

e) Optimise the potential of the Site to accommodate and sustain an appropriate amount and mix of development (including green or other public space) and support local facilities and transport networks; and

f) Create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience."

14.3.4 The NPPF section 14: Meeting the Challenge of Climate Change (para 154) states that:

"New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure;"

14.3.5 The NPPF section 15: Conserving and Enhancing the Natural Environment states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

a) Protecting and enhancing valued landscapes, Sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b) Recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services - including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

c) Maintaining the character of the undeveloped coast, while improving public access to it where appropriate;

d) Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; " (para 174)

14.3.6 In relation to AONBs, paragraph 176 states:

"Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to these issues."

Sedgemoor Local Plan 2011-2032 (adopted 2019)

14.3.7 The Site lies within the administrative area of Sedgemoor District Council (SDC). At the time of writing the development plan consists of Sedgemoor Local Plan adopted in February 2019.

14.3.8 The Sedgemoor Local Plan does not accord any specific landscape designations to the Site. However, there are areas of the Site designated as 'Local Wildlife Sites'.

14.3.9 Policy D19 Landscape includes the following extracts:

"Development within the setting of an AONB that has the potential to harm the character and visual amenity of the protected landscape will only be supported if that potential harm can be negated through appropriate and acceptable mitigation measures.

Elsewhere in the district proposals should ensure that they enhance the landscape quality wherever possible or that there is no significant adverse impact on local landscape character, historic landscape, scenic quality and distinctive landscape features as identified

in the Sedgemoor Landscape Assessment and Countryside Design Summary. In particular through:

- *Siting and landscaping that takes account of visibility from publicly accessible vantage points;*
- *The form, bulk and design of buildings having proper regard to their context in respect of both the immediate setting and the defining characteristics of the wider local area;*
- *Protecting and enhancing natural and historic features which contribute to the distinctive character of the district's landscape, such as trees, woodlands, hedgerows, soils, rivers/river corridors, ditches, open space, archaeological remains and rural buildings; and*
- *Taking account of the predicted long-term impacts of climate change on landscape.*

A Landscape and Visual Impact Assessment (LVIA) should accompany planning applications where it is judged that the landscape and visual amenity may be adversely affected by the proposed development and it is considered necessary to understand the likely effects as part of the appraisal of the development. This is to understand both the significance of and the effects of change on the landscape (as an environmental resource) and/or on visual amenity. In undertaking LVIA's reference should be made to information in relevant National Character Area profiles and the Sedgemoor Landscape Assessment and Countryside Design Summary.

Where development is necessary and could result in significant adverse effects on the landscape and on visual amenity, appropriate mitigation measures should be provided. Where a significant adverse effect cannot be avoided or markedly reduced through mitigation, then opportunities to offset, remedy or compensate for unavoidable effects will be a requirement."

14.3.10 Policy D22 Trees and Woodland states:

"Where possible development should seek in the first instance to avoid or minimise the loss of or damage to trees, woodland and hedgerow. Development that would result in the unacceptable loss of, or damage to, or threaten the continued well-being of irreplaceable habitats, such as ancient woodland and veteran trees will only be supported if the need for, and benefits of, the development in that location clearly outweigh the loss or damage. In these circumstances, if the loss or damage is deemed to constitute significant harm to biodiversity, then the developer will need to provide adequate mitigation and/or compensation in accordance with Policy D20: Biodiversity and Geodiversity.

Adequate tree and/or ecological information (proportionate to the nature and scale of the potential impact) will be required where it is judged that development proposals may affect trees, woodland or hedgerow. Development proposals that include a planting scheme should be accompanied by a Landscape Masterplan (proportionate to the scale of development) that incorporate the planting of native tree and hedgerow species that are characteristic of the local landscape and provide benefits to local wildlife.

Development that seeks to enhance and expand the district's tree and woodland resource will be encouraged and supported where it accords with the policies in the Local Plan as a whole. Conditions and/or planning obligations will be used to secure the commensurate replacement of trees, woodland and hedgerows or their protection during the course of development."

14.3.11 Policy D29 Protection and Enhancement of Existing Green Infrastructure Resources states:

“Green Infrastructure (GI) will be safeguarded, maintained, improved, enhanced and added to, as appropriate. Development proposals which compromise the integrity of the Green Infrastructure network will be resisted.

The impact of new development on existing Green Infrastructure should be properly considered. Any new development which is likely to increase usage of existing green infrastructure should recognise that increased usage may result in degradation of the existing standard of provision. In addition, maintenance costs for those who own and maintain the infrastructure may increase, and any such costs or improvements necessary should be borne by the development.

Master-planning of Strategic Site Allocations on greenfield Sites should make provision for a network of green spaces linking the Site to the wider Green Infrastructure network.”

14.3.12 Policy D30 Green Infrastructure Requirements in New Development states:

“Where appropriate the creation of Green Infrastructure in new developments should meet the following criteria:

- *be of an appropriate type, size and standard and make appropriate provision for future maintenance including where appropriate a management plan agreed with the LPA;*
- *S106 contributions will be sought for appropriate off-Site provision if on-Site provision is not possible;*
- *the provision of green spaces (wherever possible) within new developments should have particular regard to extending the connectivity of the existing Green Infrastructure network;*
- *the provision of green spaces (wherever possible) within new developments should have particular regard to contributing to the enhancement and improved coherence of identified ecological networks;*
- *in the interest of reducing recreational pressure on sensitive Natura 2000 Sites all residential development should be ANGst (Accessible Natural Green Space Standard) compliant or otherwise appropriately contribute to improving access to natural greenspace;*
- *make appropriate use of natural resources, encourage the use of sustainable materials and minimise the production of waste;*
- *should have regard for the protection of trees, woodland and hedgerow; the planting of trees and hedgerow; and woodland creation for public amenity and climate change mitigation;*
- *should have regard to the multi-functional benefits and roles of green infrastructure;*
- *if loss of existing Green Infrastructure assets is unavoidable in order to accommodate necessary development, appropriate mitigation of the loss will be required; and*
- *in all cases, including proposals for increased access to rural areas, development will need to demonstrate that there are no significant adverse impacts on biodiversity interests as set in Policy D20: Biodiversity and Geodiversity.*

Opportunities for the development to be an exemplar of best practice and innovation in the design and management of new Green Infrastructure will be encouraged.”

Puriton Energy Park Supplementary Planning Document 2012

- 14.3.13 SDC have produced the 'Puriton Energy Park Supplementary Planning Document' (SPD) which was adopted by the Council in March 2012. This document has been prepared to *'guide and inform development of the brownfield Site of the former Royal Ordnance Factory (ROF)'*.

2009 Bridgwater Vision

- 14.3.14 The Bridgwater Vision includes the Huntspill Energy Park (the 2017 Planning Consent) noted under 'Local Projects' and states:

"This site to the North of Bridgwater has been allocated as an 'Energy Park' and has been identified for the delivery of about 90 hectares of employment land."

- 14.3.15 Overall, much of the document is concerned with urban areas, and therefore other extracts are not considered pertinent to the Proposed Development. However, it is notable within The Vision, that emphasis is placed on the following key headings:

- *"Inviting + identifiable;*
- *Sustainable + vibrant;*
- *Innovative + dynamic;*
- *Cultural + authentic;*
- *Accessible + connected;*
- *Social + diverse; and*
- *Viable + deliverable."*

The Sedgemoor Landscape Assessment (SLA) 2003

- 14.3.16 This document is also adopted as supplementary planning guidance and identifies two areas of visual sensitivity; 'Visually prominent areas of high quality landscape' and 'Areas of high sensitivity in relation to road corridors' both of which will be considered in this assessment.
- 14.3.17 The SLA identifies the former ROF as being within the (c) 'Levels' sub category of "4. Levels and Moors". The SLA identifies the nearby Polden Hills area, through which the Gravity Link Road passes, as being within the "Polden Hills" a sub-category of "6. Lowland Hills" (**Figure 14.4, Appendix 14.1**). The Polden Hills elevated nature results in the two landscape character areas being inextricably linked in both landscape and visual terms. In view of this any development proposals need to be mindful of the different landscape type characteristics and their sensitivities.
- 14.3.18 Under a section entitled "Sensitivity to visual impact and the capacity for new development/key principles for new development" (pg 47, para 4.63) the SLA states:

"The opportunity for screening of new low-level development as viewed from other areas at low elevation means that capacity for development in the Levels is often higher than in many other areas of the District. This is, however, dependent on the extent of existing tree cover or potential for this to be reinforced by new planting. Sites which lie close to the higher ground and view corridors such as the ridge of the Polden Hills will also need to take account of views from these vantage points."

- 14.3.19 Given the Site's relationship with the adjacent Polden Hills these points are particularly relevant to any development strategy for the Site.

The Sedgemoor District Council Green Infrastructure Strategy (2011)

- 14.3.20 The Green Infrastructure (GI) Strategy states the following objectives:

- *GI1: To maximise opportunities to deliver a multi-functional GI network;*
- *GI2: to protect and enhance the District's distinct landscapes, including mitigating the impact of major infrastructure and development; and*
- *GI3: To protect and enhance the natural environment, including biodiversity, greenspace and water."* (page 5)

- 14.3.21 It recognises the 'Puriton Energy Centre' as a 'proposed/potential project' (which is later reflected in the 2017 Planning Consent as a safeguarded use) and recognises the 'scope for additional activities on Site including leisure and open spaces for recreation' (page 24)

14.4 Consultation

- 14.4.1 Consultation with SDC's landscape officer on the assessment methodology has been on going from project inception in 2020. These discussions focused initially around agreeing the Photographic Viewpoints for the assessment, which were approved in writing in June 2021 (email dated 28 June 2021), along with the viewpoints selected for photomontage. The Local Landscape Character Areas which were identified following both desktop and field studies to facilitate a detailed assessment of likely changes to landscape character were later agreed with the Landscape Officer/Service Manager subject to some minor adjustments requested through email and telephone conversations on 21 September 2021.
- 14.4.2 Officers from the Quantocks and the Mendips Area of Outstanding Natural Beauty (AONB) were also consulted during July 2021. The outcome of these discussions agreed the photographic locations and attracted no further comments from the Quantocks officer in an email dated 20 July 2021 which confirms they have "*no specific comments to make on the proposal as it is considered that the site is too far from the Hills to have any significant impact on the AONB*". In an email dated 3 August 2021, the Mendips AONB officer agreed that Representative Viewpoint Q: Walkers on Cross Plain within the Mendip Hills AONB was acceptable and suggested consideration of two other viewpoint locations within the AONB (along the PRoW that traverses Draycott Sleights, or on the West Mendip Way). These were considered during a visit in August 2021 to the locations, however, it was decided that the Viewpoint Q remained the most appropriate location from which to consider overall effects on receptors within the AONB.
- 14.4.3 The Scoping Opinion notes that Heritage Landscapes (which qualify for conditional exemption from capital taxes on the grounds of outstanding scenic, scientific or historic interest and are listed on the HMRC website) should be considered within the LVIA. There are only two of those listed for Somerset within the study area of the Site, which are located as follows:
- East Quantoxhead Estate (site 22) – this lies at the foot of Quantocks on the edge of study area at more than 15 km distant from the Site but outside of the Zone of Theoretical Visibility, and therefore no changes to views are anticipated;
 - Fairfield Estate (site 25) – this lies at Stogursey approximately 15 km distant from the Site on the edge of the study area but outside of the Zone of Theoretical Visibility and therefore no changes to views are anticipated.

As a consequence, effects on Heritage Landscapes have been scoped out of this LVIA.

- 14.4.4 In addition, the Scoping Opinion notes that measures should be taken to '*ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit*'. Details of layout alternatives are included in section 3.5, **chapter 3** of the ES. The Parameter plans and Design Guide provide the structure to inform and commit the developer to high quality building design at detailed design stage.
- 14.4.5 The Scoping Opinion notes that there are a number of PRoW in the vicinity of the Site, and one of these passes within the Site, across the Gravity Link Road. However, since the LVIA considers a baseline of 2032, and the Gravity Link Road is considered as part of the baseline, PRoW have been scoped out of this LVIA.
- 14.4.6 There has been ongoing consultation throughout the iterative design process undertaken through the LDO Delivery Group and Environment Sub Group which has focussed on landscape and visual issues, leading to the development of the Strategic landscape parameter plan and providing input to the Design Guide. Refer to Section 3.5 Consideration of Alternatives.

14.5 Methodology

- 14.5.1 The methodology for undertaking the LVIA follows the guidelines set out in Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA 3) (2013).
- 14.5.2 Additional guidance is taken from the following publications:
- An Approach to Landscape Character Assessment – October 2014. Christine Tudor;
 - Landscape Institute Technical Advice Note 01/2017 (Revised): Tranquillity – An Overview, March 2017; and
 - Landscape Institute TGN 06/19 Visual Representation of Development Proposals.
- 14.5.3 The aim of these guidelines is to set high standards for the scope and content of landscape and visual assessments and to establish certain principles that would help to achieve consistency, credibility and effectiveness in landscape and visual impact assessment. Guidance is contained in these publications on some approaches and techniques which have been found to be effective and useful in practice by landscape professionals. However, the guidelines are not intended as a prescriptive set of rules or as an exhaustive manual of techniques.

Study Area

- 14.5.4 The LVIA will examine the following as separate, although linked, considerations:
- Landscape effects; derived from changes in the physical landscape, which may give rise to changes in its character and how this is experienced. This may, in turn, affect the perceived value ascribed to the landscape.
 - Visual effects; related to the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects on visual amenity value of the views from surrounding uses.
- 14.5.5 The study area for visual effects is based on a combination of the extents of the desktop study; the Zone of Theoretical Visibility, and fieldwork to establish the actual extent of views on the ground. In this case, views of the Site are available, albeit distantly, from the Mendips and Quantocks AONBs, located approximately 15 km and 17 km away respectively. Refer to **Figure 14.9 and 14.10, Appendix 14.1**.

- 14.5.6 The study area for landscape effects is 5 km, with a more detailed study of local landscape character concentrated within 2 km of the Site. Refer to **Figure 14.4 and 14.5, Appendix 14.1**.

Baseline Data Collection

- 14.5.7 The landscape and visual receptors have been selected based on those identified for the 2017 ES. They have been locally adjusted in places, in order to record changes in the state of the environment since that time, and anticipated changes in baseline conditions up to 2032 (refer to **Chapter 5** for a full explanation of the 2032 baseline).
- 14.5.8 A ‘bare earth’ Zone of Theoretical Visibility Study (ZTV)² was used to check whether the predicted visual envelope of the Proposed Development had changed since 2017, and although, as anticipated, some changes were evident, generally, additional viewpoints were not considered necessary, with the exception of a single view at East Huntspill. One view was omitted within Puriton due to the baseline presence of the Gravity Link Road, and one at Glastonbury Tor in consultation with SDC due to its considerable distance from the Site.
- 14.5.9 Desktop studies provided the broad scale landscape character baseline that is set out in the SLA. However, in order to facilitate the consideration of potential changes to landscape character at a detailed scale, a number of local landscape character areas were identified during field study work. These have been largely based on the Local Landscape Character Areas identified for the 2017 ES, with adjustments to record localised changes in the state of the environment since that time.
- 14.5.10 A 2032 baseline will be used as a basis for the assessment. This baseline has been compiled with reference to:
- The current landscape and visual conditions of the study area;
 - The 2017 Planning Consent, including planting proposals with 11 years of growth (planting has been assumed to be completed in winter 2021);
 - The 2021 Arboricultural Survey (**Appendix 14.4**); and
 - The Approved Developments (**Appendices 1.3 & 1.4**).
- 14.5.11 It should be noted that whilst the 2017 Planning Consent was granted for the Huntspill Energy Park, the safeguarded land uses were also considered and assessed cumulatively in the Environmental Statement. The safeguarded land uses included some very large scale industrial elements and stacks up to 105 metres high, and although these elements did not obtain planning permission at that time, they illustrate the intention that some large scale elements could be considered.

Sensitive Receptors

- 14.5.12 The LVIA methodology including the scales used for assessing value and susceptibility to change to identify the likely sensitivity of receptors is derived from GLVIA3 and is largely the same as that used in the 2017 assessment, with some small adjustments to reflect the changes in published guidance and updated to current best practice.
- 14.5.13 The methodology follows the approach stated in relation to the assessment of the significance of landscape and visual effects, which is defined in paragraph 3.23 in GLVIA 3 “... an evidence-based process combined with professional judgement. It is important that the basis of such judgements is transparent and understandable, so that the underlying assumptions and reasoning can be understood by others” (LI and IEMA, 2013). Levels of

² A more detailed methodology explaining the mechanics of the ZTV is included within **Appendix 14.2**

landscape and visual effects are determined by consideration of the ‘sensitivity’ of each receptor or group of receptors and the nature or ‘magnitude’ of the effect that would result from the Proposed Development.

- 14.5.14 The assessments reported in the LVIA represent the culmination of an iterative design and assessment process and therefore relate to the remaining residual effects that could not otherwise be mitigated or ‘designed out’.

Defining Receptor Sensitivity

- 14.5.15 The sensitivity of receptors is derived from a combination of their susceptibility to the specific change brought forward by the Proposed Development and their value.

- 14.5.16 The value of landscape receptors or viewpoints will be considered in line with the criteria identified in **Tables 14.1 and 14.2** below:

Value		Explanation
Very High	Elements	Landscape with highly valued physical attributes/elements (eg mature trees and woodlands), possibly rare, in good condition, which makes a strong positive contribution to the landscape character and sense of place and which would not be replaceable.
	Character	Highly valued landscape in good condition which makes a strong positive contribution to the landscape character over a wide area and which would not be replaceable. Highly valued landscape which makes a very important contribution to/plays a strong role in the approach to and/or setting of a designated and/or recognised historic settlement or heritage asset.
	Designation	Landscapes with characteristics and attributes that have been identified as of national significance. Landscapes which may be recognised through formal designation e.g. World Heritage Sites, National Parks, Areas of Outstanding Natural Beauty (AONBs) or containing attributes of these recognised landscapes. Areas of recognised high cultural and/or historic value.
High	Elements	Landscape with highly valued physical attributes/elements (e.g. mature woodlands and/or trees) in fair condition or moderately valued elements (e.g. trees that contribute less positively to the local landscape) in good condition that make a positive contribution to local character and sense of place and that would take some considerable time to replace.
	Character	Highly valued landscape in fair condition or moderately valued landscape in good condition which makes strong positive contribution to landscape character and could be replaced and/or mitigated within medium to long term. Landscape which makes some positive contribution to landscape character and would take considerable time to replace and/or would be likely to be adversely affected, by the type of change being proposed.

		Highly valued landscape which makes an important contribution to/plays a strong role in the approach to and/or setting of a recognised historic settlement or heritage asset.
	Designation	Landscapes with characteristics of national, or regional significance, not in the highest condition. Areas of recognised cultural and/or historic value.
Medium	Elements	Commonplace, moderately valued landscape elements and features in fair condition which make some positive contribution to the landscape character and sense of place. Elements are replaceable but maturity would take some time e.g. trees that contribute less positively to the local landscape or hedgerows that contribute to the area but could be replaced over time.
	Character	Moderately valued landscape in fair condition which makes some positive contribution to the local landscape character. Elements are replaceable but their replacement would take some time. Valued landscape which makes a moderately important contribution to/plays a moderate role in the approach to and/or setting of a settlement or heritage asset.
	Designation	Landscapes with characteristics and attributes which have been identified to be of regional or local significance and are in good condition. These landscapes may be recognised through formal local authority designation or contain attributes of similar locally designated landscapes. Areas with some features of cultural and/or historic value.
Low	Elements	Commonplace landscape elements of limited/low value which are in poor condition but still make a moderate contribution to the site but not the wider landscape. Elements that would be easily replaceable eg. a gapped hedgerow or a hedge that would easily be replaceable.
	Character	Landscape elements of moderate local value which make a limited/focused contribution to a relatively small landscape/area or landscape elements of limited/low value in a poor condition but which nevertheless could be treated such that they would make a positive contribution to the surrounding landscape e.g. broken or gapped hedgerows in larger networks of fields and hedgerows but would be filled and integrity retrieved. Landscape which makes a minor contribution to/plays some role in the approach to and/or setting of a settlement or heritage asset.

	Designation	<p>Landscape/features valued at a community level, perhaps through their contribution to setting or their recreational value, but not necessarily recognised through any formal designation.</p> <p>Areas with few features of cultural and/or historic value.</p>
Very Low	Elements	<p>Landscape elements of low value and in a poor condition that make little contribution to the site and the surrounding landscape.</p> <p>Features and elements that are incongruous, derelict or in decline, resulting in indistinct character with little or no sense of place.</p>
	Character	<p>Landscape elements of limited/low value which may be in poor condition and do not contribute notably to the surrounding landscape. Elements would be easily replaceable.</p> <p>Landscape does not make a contribution to/play a part in the approach to and/or setting of a settlement or heritage asset.</p>
	Designation	<p>Landscapes not covered by a local or national designation for landscape with very few locally valued features present</p> <p>Areas with few, if any, features of cultural and/or historic value.</p>

Table 14.1 Landscape Receptor Value Criteria

Value	Explanation
Very High	<p>Views of landscape recognised for its intrinsic qualities and scenic beauty, likely to be internationally or nationally designated, or heritage assets where visual setting is key.</p> <p>Views from popular viewpoints, e.g hillforts, look-out points.</p> <p>Views may be recognised or referred to in guide books, maps or references to the view/landscape in literature and art.</p> <p>Views with few overt or intrusive or detracting elements in the view.</p>
High	<p>May include views of landscapes which are nationally or locally designated for their various qualities and scenic beauty, but the view may include some manmade detracting elements.</p> <p>View may include heritage assets where visual setting is a consideration.</p> <p>May include views from designated/national trails or named recreational paths.</p> <p>Views may be recognised or referred to in local guide books and local literature.</p>
Medium	<p>Views valued at regional or local level, which may be recognised in local guide books/tourist maps or referred in local literature.</p> <p>A view with some scenic quality (this may include views across or within a locally designated landscape) There are some overt intrusive manmade elements in the view.</p>

Low	<p>A view with low scenic quality. There may be a number of overt or intrusive human elements already in the view.</p> <p>Unlikely to be recognised through local designation or appear in local guidebooks/ tourist maps & guides.</p>
Very Low	<p>A view with low scenic quality. Likely to be views which are transient or within a degraded landscape and there are existing degraded elements in the landscape.</p> <p>Not situated with or alongside an area designated for its landscape character or visual amenity and with no recognition in local guidebooks/tourist maps & guides.</p>

Table 14.2 Viewpoint Value Criteria

- 14.5.17 The susceptibility of a landscape receptor is defined as its susceptibility to accommodate the proposed type of development. Any 'inherent' or 'intrinsic' sensitivities ascribed to a particular landscape through designation or characterisation will not have accounted for a specific type of development. The professional judgement about the susceptibility of the receptor to the specific change will be recorded in the text.
- 14.5.18 The susceptibility of a visual receptor to the change in a view is a result of their occupation or activity combined with the extent to which their attention is focussed on the view. The table below sets out the considerations which may be taken into account when assessing susceptibility. The professional judgement applied will be clearly outlined in the text. The susceptibility to change of landscape receptors or viewpoints will be considered in line with the criteria identified in **Tables 14.3 and 14.4** below:

Susceptibility	Explanation
Very High	<p>The receptor is unable to accommodate the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer very limited opportunities for accommodating the change without those key characteristics being detrimentally altered.</p> <p>Key landscape elements and/or characteristics that would be adversely affected by the type of development that is proposed and would not be able to be replaced or would take a considerable time to replace (e.g. Mature trees/woodland).</p>
High	<p>The receptor would have difficulty in accommodating the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer limited opportunities for accommodating the change without those key characteristics being detrimentally altered.</p> <p>Key landscape elements and/or characteristics that would be adversely affected by the type of development that is proposed and would take a considerable time to replace (e.g. Mature/semi mature trees/woodland).</p>
Medium	<p>The receptor is partly able to accommodate the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer some opportunities for accommodating the change without those key characteristics being detrimentally altered.</p> <p>Key landscape elements and/or characteristics that would be adversely affected by the type of development that is proposed but could be replaced over time. (e.g. young trees/woodland).</p>

Low	<p>The receptor is more able to accommodate the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape are resilient to being changed whilst other elements in the landscape may benefit from change where these are at contrast to the existing general landscape character.</p> <p>Key landscape elements and/or characteristics that would be adversely affected by the type of development that is proposed but would be replaceable in the short to medium term. (e.g. Recently planted trees/hedgerows).</p>
Very Low	<p>The receptor is able to accommodate the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape are resilient to being changed whilst other elements in the landscape may benefit from change where these are at contrast to the existing general landscape character.</p> <p>Key landscape elements and/or characteristics that would be adversely affected by the type of development that is proposed and would be easily replaceable (e.g. Features in very poor condition).</p>

Table 14.3 Landscape Susceptibility Criteria

Susceptibility	Explanation
Very High	<p>Viewers whose occupation or activity is such that the view being experienced is likely to be the focus of their attention or interest: and</p> <p>Viewers with prolonged viewing opportunities.</p> <p>Examples may include residents whose outlook forms a key component of their day to day lives, or visitors to attractions known for their particular views or visual setting.</p>
High	<p>Viewers whose occupation or activity is such that the view being experienced is likely form a point of interest: and</p> <p>Viewers whose viewing opportunity may be 'broken' or interrupted.</p> <p>Examples may include local residents, visitors to recognised attractions or those using recognised scenic routes.</p>
Medium	<p>Viewers with a moderate awareness of their surroundings and whose occupation is such that while they may appreciate the view, it would not be fundamental to the satisfaction of the viewers' activity.</p> <p>Examples may include those using local footpaths, transport routes, residents with views from rooms not normally occupied during waking hours.</p>
Low	<p>Viewers with a passing awareness of and limited interest in their surroundings, and for whom the view is likely to play a minimal role to the satisfaction of their occupation or activity; and</p> <p>Views which are incidental to the activities of the visual receptors.</p> <p>Examples may include people at their place of work, those engaged in outdoor recreation that does not depend on appreciation of the view or those travelling at speed.</p>

Very Low	<p>Viewers with a minimal awareness of or interest in their surroundings, and for whom the view is unlikely to play any meaningful role in their occupation or activity. Such views are likely to only be incidental to those activities taking place.</p> <p>Examples may include people at their place of work whose attention may be focused on their work or activity and not on their surroundings.</p>
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Table 14.4 Susceptibility of Visual Receptors Criteria

- 14.5.19 Landscape and visual sensitivity are assessed through '*combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape*' (GLVIA 3 para 5.39). **Table 14.5 and 14.6** below sets out typical examples. The application of professional judgement regarding the sensitivity of the landscape receptors will be clearly outlined within the assessment.

Sensitivity	Typical Examples
Very High	<p>Highly valued landscapes, which by their nature would be unable to accommodate the type of change proposed. Typical examples may be:</p> <ul style="list-style-type: none"> • Landscapes of national significance, likely to be recognised through formal designation e.g. World Heritage Sites, National Parks, Areas of Outstanding Natural Beauty (AONBs) or containing attributes of these recognised landscapes; • Landscapes with highly valued physical attributes/elements and/or characteristics possibly rare, in good condition which make a strong positive contribution to the landscape character and sense of place and could not be replaced or would take some considerable time to replace e.g. Mature woodlands or trees; • Areas of special recognised value through use, perception or historic and cultural associations; and • Highly valued landscapes which make a very important contribution to/play a strong role in the approach to and/or setting of a designated and/or recognised historic settlement or heritage asset.
High	<p>Highly valued landscapes, which by their nature would be less able to accommodate the type of change proposed. Typical examples may be:</p> <ul style="list-style-type: none"> • Landscapes of national or regional significance, not in the highest condition, which may to be recognised through formal designation e.g. National Parks, AONBs Local Landscape Designation or containing attributes of these recognised landscapes; • Highly valued landscape with some demonstrable physical attributes/elements and/or characteristics (mature woodlands and/or trees) in fair condition or moderately valued elements (eg trees that contribute less positively to the local landscape) in good condition that make a positive contribution to local character and sense of place and that would take some considerable time to replace; • Areas of special recognised value through use, perception or historic and cultural associations; and • Highly valued landscapes which makes an important contribution to/plays a strong role in the approach to and/or setting of a recognised historic settlement or heritage asset.

Medium	<p>Landscapes, which by their nature would be partly able to accommodate the type of change proposed. Typical examples may be:</p> <ul style="list-style-type: none"> • Landscapes which are unlikely to be nationally designated, but may be locally designated; • Moderately valued landscape with relatively few physical attributes/elements and/or characteristics which lift the landscape above the ordinary. The elements/characteristics are in fair condition, which are replaceable but this may take some time; • Areas containing some features of value through use, perception or historic and cultural associations; and • Valued landscapes which make a moderately important contribution to/plays a moderate role in the approach to and/or setting of a settlement or heritage asset.
Low	<p>Landscapes, which by their nature would be more able to accommodate the type of change proposed. Typical examples may be:</p> <ul style="list-style-type: none"> • Landscapes which are unlikely to be designated; • Landscape with commonplace elements/characteristics in poor condition, which may be easily replaceable or repaired; • Areas containing few, if any, features of value through use, perception or historic and cultural associations; and • Landscapes which make a minor contribution to/plays some role in the approach to and/or setting of a settlement or heritage asset.
Very Low	<p>Landscapes, which by their nature would be able to accommodate the type of change proposed. Typical examples may be:</p> <ul style="list-style-type: none"> • Landscapes which are not designated; • Landscapes with elements/characteristics in poor condition and may be discordant, derelict or in decline and which may be easily replaced; • Areas containing few, if any, features of value through use, perception or historic and cultural associations; and • Landscapes which do not make a contribution to/play a part in the approach to and/or setting of a settlement or heritage asset.

Table 14.5 Landscape Sensitivity Criteria

Sensitivity	Explanation
Very High	<p>Viewers who are very sensitive/highly attuned to their surroundings with a prolonged intact viewing opportunity of the landscape. Views are likely to be of internationally or nationally designated landscapes or heritage assets. Views may be recognised in art or literature and noted in guide books: Examples may include:</p> <ul style="list-style-type: none"> • Visitors to recognised viewpoints/look-out points such as hillforts; • Visitors to heritage assets of which visual setting is a key component; • Walkers/Riders using national trails through nationally designated landscapes; • Motorists using recognised 'scenic' routes; and • Residents whose properties have been orientated to take advantage of a view, and/ or for whom the view comprises a key component of their daily lives.
High	<p>Viewers who are highly attuned to their surroundings but their interest and viewing opportunity may not be prolonged but broken or interrupted. Views may be of nationally or locally designated landscape or of heritage assets and may be noted in local guide books and recognised in art and literature. Examples may include:</p> <ul style="list-style-type: none"> • Walkers/Riders using national trails or popular footpaths/Bridleways; • Visitors to some heritage assets; • Motorists travelling through high quality landscapes; and • Local residents who may be able to see the view from rooms normally occupied during waking hours.
Medium	<p>Viewers with a moderate awareness of their surroundings and whose occupation is such that while they may appreciate the view, it would not be fundamental to the satisfaction of the viewers' activity. Views may be of a locally designated landscape or a heritage asset, but it is unlikely to figure in guidebooks, art or literature. Examples may include:</p> <ul style="list-style-type: none"> • Less well used public footpaths/bridleways; • Travellers on local roads through a moderate quality landscape; and • Local residents with views from rooms not normally occupied during waking hours.
Low	<p>Viewers with a passing awareness and limited interest in their surroundings. Views unlikely to be of designated landscape or noted in guidebooks, art or literature. Views may have a number of overt or intrusive elements. Examples may include:</p> <ul style="list-style-type: none"> • People engaged in outdoor recreation/sport which does not depend upon the appreciation of the view; • People at their place of work; and • Travellers on fast moving roads.

Very Low	<p>Viewers with a passing awareness and limited interest/focus in their surroundings. Views not designated or noted in guidebooks, art or literature. Views of a degraded landscape with a number of overt or intrusive elements: Examples may include:</p> <ul style="list-style-type: none"> • People at their place of work; and • Travellers on fast moving roads with only transient views.
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Table 14.6 Visual Sensitivity Criteria

14.5.20 The experience of visual receptors at the viewpoints shown on accompanying **Figures 14.9-14.28, Appendix 14.1** will form the basis of the visual assessment, listed below as follows:

- Representative Viewpoints A & B: Motorists on M5 and motorists and pedestrians on Batch Road to the west of the Site;
- Representative Viewpoint C: Motorists on the new Gravity Link Road/motorists on Woolavington Road;
- Representative Viewpoint D: Motorists on Woolavington Road;
- Representative Viewpoints E & F: Motorists on the Causeway and walkers at the Causeway Car Park;
- Representative Viewpoint G: Residents in and around East Huntspill
- Representative Viewpoint H: Walkers on Footpath BW 28/2 and residents at the eastern edge of Puriton;
- Representative Viewpoint I: Walkers and horse riders on Bitham Lane bridleway (no. BW 28/1) along the Polden Hills Ridge;
- Representative Viewpoint J: Motorists and pedestrians on Hillside;
- Representative Viewpoint K: Motorists, walkers and residents of Woolavington;
- Representative Viewpoint L: Residents and motorists on the A39 and the Gravity Link Road;
- Representative Viewpoints M: Motorists on Bristol Road and residents of Pawlett;
- Representative Viewpoint N: Walkers/Bird Watchers in Steart (England Coast Path/River Parret Trail Long Distance Trail No BW25/3);
- Representative Viewpoint O: Walkers on Lydeard Hill within the Quantock Hills AONB;
- Illustrative Viewpoint P: People to the south of the Polden Hills (including residents, motorists, walkers);
- Representative Viewpoint Q: Walkers on Cross Plain within the Mendip Hills AONB; and
- Specific Viewpoint R: Walkers on Brent Knoll.

14.5.21 A Lighting Impact Assessment has been provided in **Appendix 14.5** in order to consider the baseline night time context of the Site and effects on night time views.

Assessment of Significance

14.5.22 The approach adopted to defining significance is noted in this section. Although based on the generic significance criteria for the ES, the thresholds noted in the generic significance criteria have been adapted for this chapter as a result of:

- Reference to discipline specific criteria such as protected landscapes;
- Consultation with consultees;
- Comparison with experience on similar projects elsewhere; and
- Experience and professional judgement of the specialist assessor.
- This corresponds with the approach set out and agreed through EIA Scoping.

Magnitude of Effect

14.5.23 Effects may be beneficial, neutral (no change), or adverse, direct, indirect or secondary, cumulative, permanent or temporary, or extending over different time frames (short, medium or long term). They can also arise at different scales, (local, district, county, regional or national) and have different levels of significance (Substantial through to Negligible/No Effect).

14.5.24 The assessment of effects aims to:

- Identify logically and clearly the likely landscape and visual effects of the Proposed Development;
- Identify the value related to the receptor, its susceptibility to change and the resulting nature/sensitivity of the receptor;
- Identify the scale/size, duration and 'reversibility' of the effect and the resulting 'magnitude of effect';
- Provide an assessment of the nature and significance of these effects in a logical and well-reasoned fashion; and
- Indicate the measures proposed to avoid, reduce, remedy or compensate for these effects (mitigation measures).

14.5.25 While tables and matrices may be used to support and summarise the assessment, the emphasis in this assessment will be on descriptive text describing the predicted landscape and visual effects with logical, well-reasoned judgements about their significance. Consideration is given to the effects during the short, medium and long term.

14.5.26 Year 1 is taken to be when the entire development is completed (i.e. 2032). Each of the photographic viewpoints chosen for photomontages have two images. The first at Year 1, when the entire development is completed, the second at Year 15 (i.e. 2047).

14.5.27 The approach taken in defining the magnitude of effect brought about by introducing a development on the landscape character is presented in the table below. Landscape characteristics may include landform, scale, field patterns, vegetation, buildings and other features of the landscape which combine to give an area its overall character.

Sensitivity	Explanation
Very High	<p>The proposed development would lead to an extensive or widespread, irreversible complete alteration of existing landscape character/elements with large scale new features and elements;</p> <p>The addition of new and uncharacteristic conspicuous features and elements (adverse change);</p> <p>The removal, restoration and/ or replacement of existing highly conspicuous and uncharacteristic features and elements (beneficial change).</p>
High	<p>The proposed development would lead to a notable but not extensive change to existing landscape character/elements over a wide area or an intensive change over a more limited area;</p> <p>The addition of new but uncharacteristic prominent features and elements (adverse change);</p> <p>The removal, restoration and/ or replacement of existing highly uncharacteristic features and elements (beneficial change).</p>
Medium	<p>The proposed development would lead to a partial change to existing landscape character/elements which may be partially reversible;</p> <p>The addition of new but uncharacteristic noticeable features and elements (adverse change);</p> <p>The removal, restoration and/ or replacement of existing moderately uncharacteristic features and elements (beneficial change).</p>
Low	<p>The proposed development would lead to a small or relatively localised change in the existing landscape character/elements;</p> <p>The addition of new but uncharacteristic perceptible features and elements (adverse change);</p> <p>The removal, restoration and/ or replacement of existing perceptibly uncharacteristic features and elements (beneficial change).</p>
Very Low	A negligible, potentially reversible change in existing landscape character or landscape elements.
None	No Change.

Table 14.7: Magnitude of Effect - Landscape Criteria

14.5.28 The magnitude of effect likely to be brought about by the Proposed Development on visual amenity will be assessed using the following magnitude of effect criteria:

Sensitivity	Explanation
Very High	<p>The proposed development would result in a complete alteration to the characteristics of the view such that post development the existing view would be completely changed;</p> <p>The addition of new and uncharacteristic conspicuous features and elements (adverse change);</p> <p>The removal, restoration and/or replacement of existing highly conspicuous and uncharacteristic features and elements (beneficial change).</p>
High	<p>The proposed development would result in a change in the view such that it becomes the key influence and focus in the view;</p> <p>The addition of new and obvious uncharacteristic features and elements (adverse change);</p> <p>The removal, restoration and/ or replacement of existing uncharacteristic features and elements (beneficial change).</p>
Medium	<p>The proposed development is clearly visible in the view and forms an important but not defining element of the view. The feature may integrate partially;</p> <p>The addition of new and noticeable uncharacteristic features and elements (adverse change);</p> <p>The removal, restoration and/or replacement of existing moderately uncharacteristic features and elements (beneficial change).</p>
Low	<p>The proposed development is visible, but forms a small element and minor alteration in the view and integrates well with existing landscape/features;</p> <p>Slight change to the existing character or features and elements;</p> <p>The addition of new but perceptible uncharacteristic features and elements (adverse change);</p> <p>The removal, restoration and/or replacement of existing perceptibly uncharacteristic features and elements (beneficial change).</p>
Very Low	<p>The proposed development may go unnoticed as a small element in the view, or is not readily visible.</p>
None	<p>No change.</p>

Table 14.8 Magnitude of Effect - Visual Criteria

Significance of Effect

14.5.29 The landscape and visual sensitivity of receptors is identified using a five point scale from 'Very High' to 'Very Low' and this is then combined with magnitude of effect to arrive at a predicted level of effect.

14.5.30 The following chart for predicting levels of effect on landscape and visual receptors is provided, based on industry best practice:

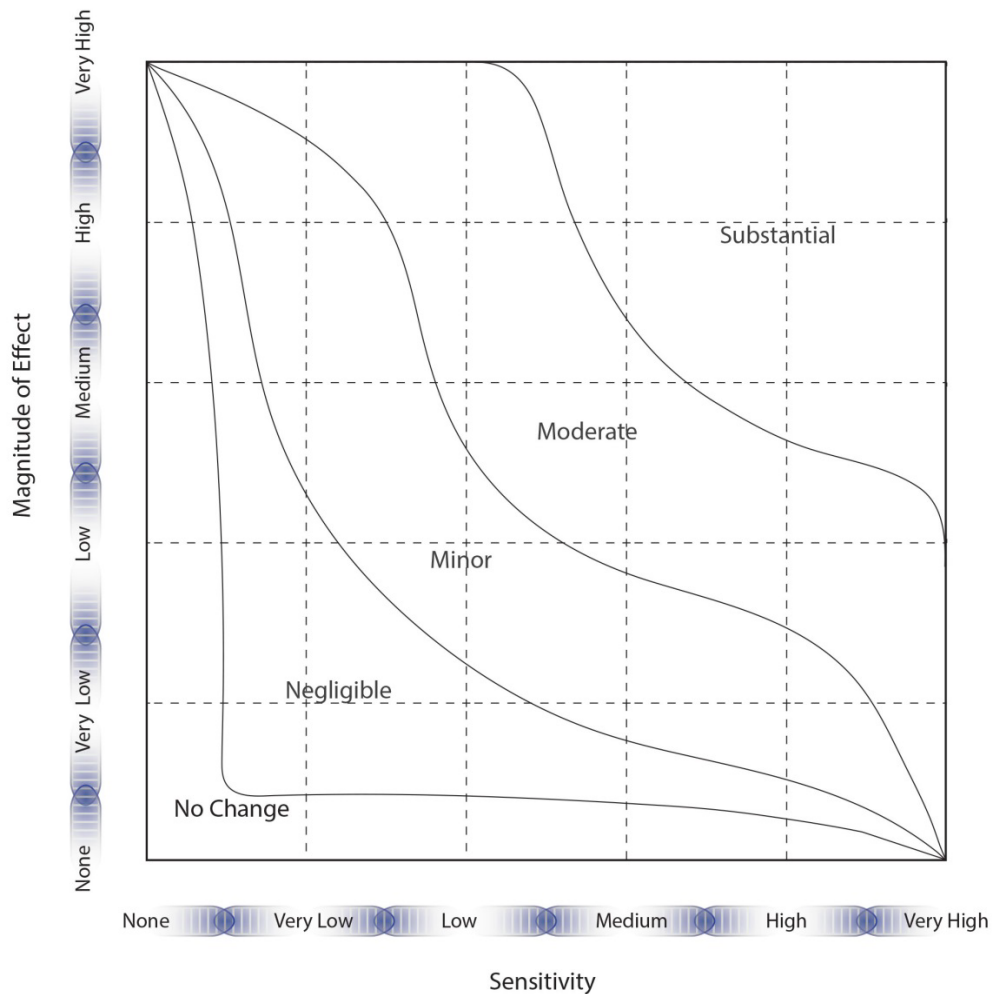


Table 14.9 Significance of Effects Table

Definition of Effects

14.5.31 The following tables identify the criteria for levels of effect on landscape and visual receptors:

Table 14.10: Description of Levels of Effect on Landscape Receptors

Substantial Adverse	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a major deterioration to the quality and character of the existing landscape resource; • Be at considerable variance with the character of the existing landscape; • Degrade or lose the integrity of characteristic features or elements; • Damage or lose the sense of place or local distinctiveness of the area;
Moderate Adverse	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a noticeable deterioration to the quality and character of the existing landscape resource; • Conflict with the character of the existing landscape; • Have a negative impact on some characteristic features or elements; • Diminish the sense of place or local distinctiveness of the area;
Minor Adverse	<p>The development would:</p> <ul style="list-style-type: none"> • Cause some deterioration to the quality and character of the existing landscape resource; • Not wholly fit with the character of the landscape; • Be at slight variance with the existing characteristic features or elements; • Slightly detract from the sense of place or local distinctiveness of the area;
Negligible	<p>The development would:</p> <ul style="list-style-type: none"> • Give rise to no discernible change to the quality and character of the identified landscape resource; • Maintain the character of the landscape/ townscape; • Complement/ blend in with the existing characteristic features or elements; • Retain the sense of place or local distinctiveness of the area.
No Change	
Minor Beneficial	<p>The development would:</p> <ul style="list-style-type: none"> • Complement and give rise to a perceptible improvement in the quality and character of the identified landscape resource. • Maintain and/or enhance the existing characteristic features or elements; • Enable some of the sense of place or local distinctiveness of the area to be restored.
Moderate Beneficial	<p>The development would:</p> <ul style="list-style-type: none"> • Give rise to a noticeable improvement in the quality and character of the identified landscape resource; • Enable the creation, repair, conservation and/or restoration of characteristic features or elements partially lost or diminished as a result of inappropriate management or prior development;

	<ul style="list-style-type: none"> • Enable the sense of place or local distinctiveness of the area to be restored.
Substantial Beneficial	<p>The development would:</p> <ul style="list-style-type: none"> • Greatly enhance and give rise to a major improvement to the quality and character of the identified landscape resource; • Enable the creation, repair, conservation and/or restoration of characteristic features or elements lost or harmed as a result of inappropriate management or prior development; • Greatly enhance/reinstate the sense of place or local distinctiveness of the area.

Table 14.11: Description of Levels of Effect on Visual Receptors

Substantial Adverse	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a large deterioration in the existing view and visual amenity of the receptor.
Moderate Adverse	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a noticeable deterioration in the existing view and visual amenity of the receptor.
Minor Adverse	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a barely perceptible deterioration in the existing view and visual amenity of the receptor.
Negligible	<p>The development would:</p> <ul style="list-style-type: none"> • Cause no discernible deterioration or improvement to the existing view or visual amenity of the receptor.
No Change	
Minor Beneficial	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a barely perceptible improvement in the existing view or visual amenity of the receptor.
Moderate Beneficial	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a noticeable improvement in the existing view and visual amenity of the receptor.
Substantial Beneficial	<p>The development would:</p> <ul style="list-style-type: none"> • Cause a large improvement in the existing view and visual amenity of the receptor.

- 14.5.32 Significance is strongly linked to context and scale. For example, whilst a development may be 'significant' to a visual receptor in a nearby single secluded house, the effect may not be 'significant' when considering a larger series of residential receptors further away. Similarly the loss of trees which are a local feature may be considered 'significant' locally, but of little or no significance to larger character areas within which the trees sit. In addition, whilst an effect may be 'significant', it does not necessarily follow that it would be unacceptable or regarded as an 'undue consequence' (GLVIA3 para 5.40). Whether or not an effect is 'significant' will be assessed for each receptor. In this case, levels of effect of Moderate to Substantial will be considered 'Significant' in EIA terms, and those of Minor to No Change considered 'Not Significant'.

Limitations

- 14.5.33 Whilst a useful tool in understanding the Site, assuming a 2032 baseline presents some limitations for landscape and visual studies, since both are dynamic concepts, subject to vegetation growth, and with it, corresponding changes to appearance and character. In this case, the viewpoint photography was carried out in 2021, with 2032 wireline images produced for those views selected for photomontage based on information from the 2017 Planning Consent and the Approved Developments (**Appendix 1.3 & 1.4** in Volume 2 of this ES).
- 14.5.34 It is recognised that a project of this scale may come forward in a number of phases and over many years, and in addition to this, the assessment is to be based on a 2032 baseline. This presents a limitation when assessing effects at Construction and Operation (Year 1 and Year 15), given that it is anticipated that construction will be ongoing on some phases while others may have been completed for some time, due to the market-led nature of the Proposed Development. Phasing will be addressed in the assessment to the extent that this is possible in the context of information available at the time, with regard to effects resulting from the construction programme. Given this uncertainty we assess the Operational Effects at Year 1 and Year 15, as would normally be expected in an LVIA, to allow for the maturing of newly planted vegetation, and enable the Proposed Development to achieve its design aspirations but recognise that this is potentially a simplification of the reality.

Assumptions in the Preparation of the 2032 Baseline

- 14.5.35 For the baseline 2032, in agreement with the arboricultural consultant's advice, it is assumed that tree growth for the planting proposals as part of the 2017 Planning Consent would be approximately 6-10m in the 11 years from 2021 to 2032. For existing vegetation present on the Site in 2021, tree growth would be assumed to be approximately 7.5-8m in 11 years, to a maximum height of 21 m, although in reality some species could be taller.

Assumptions for the Proposed Development

- 14.5.36 For stacks and flues, given that the final details of stacks and flues is unconfirmed at this stage, our working assumption is that they would be located on the large commercial unit(s) and the EON site. There are two scenarios within the assessment; stack heights of up to 10 m above the height of the commercial unit(s) are normally required in such facilities, however, in some, exceptional circumstances, stacks of up to 25 m are required, plus or minus 2 m from existing ground level. Therefore, it is assumed that 10 m stack heights are the most likely but 25 m are also assessed, plus or minus 2 m from existing ground level. (as shown on the building heights plan). The number of stacks cannot be fixed at this stage. It is assumed that stacks would include a medium intensity red aviation light located as close as possible to the top of the structure.
- 14.5.37 In agreement with the arboricultural consultant's advice, tree growth within structure planting is assumed to be between 8-11.5m in 15 years.

14.6 Baseline Conditions

Current State of the Environment

- 14.6.1 The following descriptions consider the Site in its current form at the time of writing in 2021, which includes the new Gravity Link Road, Site remediation and ecological enhancements. Refer to **Figures 14.1 – 14.29, Appendix 14.1**.

Landscape Context

- 14.6.2 The Site lies approximately 2 km to the east of Junction 23 of the M5 motorway, approximately 0.5 km to the north of the village of Puriton, 6 km to the north east of the town of Bridgwater, Somerset (See **Figure 14.1 and 14.2, Appendix 14.1**). The majority of the Site sits at a level of between approximately 4.5 to 7.3 m Above Ordnance Datum (AOD) at the foot of the Polden Hills in the low lying landscape of Somerset, although the southernmost part rises up towards the Woolavington Road. The corridor for the Gravity Link Road lies on rising ground to the south of Puriton connecting with the A39 at a level of approximately 37 m AOD. Despite the influence of the nearby motorway, the landscape setting of the Site is largely rural, however the villages of Puriton and Woolavington are urban in nature and as such may better be described as 'townscape'. For simplicity, this assessment uses the term 'landscape' throughout in order to describe the setting of the Proposed Development. **Figure 14.3, Appendix 14.1** illustrates the landscape planning context of the Site.

LDO Site Description

- 14.6.3 The Site is made up of a number of elements relating to the former Royal Ordnance Factory (ROF) whose limits are defined by a 2.4 m high security fence, a number of agricultural fields, a reed bed, a 'borrow pit' fishing lake, the Site entrance area, and spurs from the main body of the Site which include a section of disused railway line to the north, and the Gravity Link Road running from the A39 to the south of Puriton to meet the Woolavington Road. Refer to **Figure 14.2, Appendix 14.1**.
- 14.6.4 The current state of the environment on the Site is in a transitional stage, with the majority of demolition and remediation works completed in November 2020 within the former ROF, and the Gravity Link Road corridor works largely complete, although without planting at the time of writing in Summer 2021. In addition, the route of the T-pylons on the Hinkley Connection Project runs through the Site's south eastern corner, and temporary works associated with this construction project are present both on the Site and in the surrounding landscape at the time of writing. The current state of the environment on the Site and its immediate vicinity in 2021 is considered to include the Gravity Link Road corridor (minus planting proposals), the majority of the remediation on the Site completed, the removal of the existing north-south pylon run, and its replacement with the new Hinkley T-pylons.

Description of Former ROF within the ROF fence

- 14.6.5 The main body of the central part of the Site consists of the former ROF, which ceased to be operational in 2008. Since its closure the Site has been subject to an ongoing decommissioning and decontamination process which started in 2010. This has included the lifting of defunct railway track, the removal of a number of industrial buildings and plant, the removal of buildings within the blast mounds and the mounds themselves and removal of some vegetation. This decommissioning and demolition work has been undertaken in accordance with the 2011 planning permission for the remediation works, and the majority is now complete.
- 14.6.6 In 2021, this area is generally flat at between approximately 5-6 m AOD following recent levelling as part of remediation works, with the exception of a landscape feature on the western boundary, which is comprised of a bund which has been colonised by self seeded

vegetation. Although historically this area was relatively flat, and crossed by a network of ditches, the ROF topographical features consisted of numerous 4-6 m high, grass covered munitions storage/blast mounds, varying in height between 4.5 and 7.3 m AOD. However, these have largely been levelled at the time of writing, with only one remaining.

- 14.6.7 The ROF came into existence in the late 1930's to manufacture armaments. The internal road system was broadly laid out in a manner which retained and respected the existing network of ditches that typify the low lying landscape of Somerset. These ditches remain largely in existence and have been cleared as part of the remediation process. The main industrial plant buildings and acid processing apparatus were situated in the central portion of the Site astride a north south spine road (Main Road). They comprised of a series of large sheds, tanks, chimneys and external pipes, several rising to three or more storeys in height. These buildings have now been removed leaving the area with a derelict character.
- 14.6.8 There are currently three access points to the Site; the new roundabout junction with Woolavington Road connecting to the Gravity Link Road, the old southern entrance gate from the Woolavington Road which leads directly towards Main Road, and a single lane gravel track to the east of the Site, with an asphalt bellmouth junction onto the Causeway. There is a gravel perimeter track adjacent to the ROF security fence, and there are two other gates in the fence to access the railway corridor, and the reed beds.
- 14.6.9 There is a considerable amount of mature vegetation on Site as illustrated in **Appendix 14.1, Figure 14.2: Existing Landscape Site Features and Conditions**, including several blocks of woodland which appear prominent in the wider landscape. The trees on Site have been subject to arboricultural survey (**Appendix 14.4**).
- 14.6.10 The most significant block of planting is a tall, mature stand of Hybrid Black Poplar in the north-western part of the Site which is clearly visible in the wider landscape (See **Figure 14.2, Appendix 14.1**). During the early 1990's areas of nature conservation orientated woodland planting were introduced in a number of locations around the perimeter of the former ROF, and these young woodlands now form attractive features within the Site.
- 14.6.11 Within the Site there are somewhat gappy avenues of horse chestnuts found along several of the ROF arterial roads. There are also a large number of trees along the southern ROF boundary, including a number of mature conifers which form an incongruous feature amongst the mainly deciduous trees and hedgerows found across the surrounding low lying, agricultural landscape.
- 14.6.12 Historically the ROF had a rail link, albeit, this was decommissioned in the 1970's. The defunct rail loading yard was situated along the western side of the Site, although the rail lines have now been removed. A 'landscape feature' which includes earth mounding now occupies this area close to the western Site boundary, constructed as part of the remediation process and is now covered in recently self-seeded vegetation.
- 14.6.13 The ROF has a number of features which might be considered of historical interest, including the one remaining blast mound which has been retained as part of the remediation process, the remaining ditch system and the series of defence posts/pill boxes that were constructed around the perimeter to protect the Site during the Second World War.

Description of Land outside the ROF fence and Gravity Link Road corridor connecting with the A39

- 14.6.14 The land outside the ROF fence is predominantly pastoral. The small fields between the ROF fence and Woolavington Road lie on gently sloping ground at a level of approximately 8-18 m AOD and are divided by maintained hedgerows with a number of larger trees. To the south of Woolavington Road the ground begins to rise up more steeply to form the Polden Hills. Similarly this area of land comprises broadly square pastoral fields divided by managed hedgerows with a number of larger trees, although fields are much larger. The Gravity Link Road corridor cuts through the fields to the south and east of Puriton before connecting with

the A39 at a level of approximately 37m AOD, and the Hinkley Point T-pylons pass through this landscape, crossing the south eastern corner of the Site.

- 14.6.15 An area around the former ROF entrance to Main Road comprises two links off the Woolavington Road, an east and west approach which join together to form a 'horseshoe'. These access roads are lined by avenues of mature horse chestnut trees which, along with other Site trees, have been subject to an Arboricultural Impact Assessment (**Appendix 14.4**).
- 14.6.16 The area of land contained by these roads is largely pasture, with the exception of an area to the east of the eastern approach road which is a playing field. At the entrance itself, there are large areas of hardstanding with old bicycle shelters, a bus stop and a social club.
- 14.6.17 Approximately halfway along the Site's eastern boundary is a 5.2Ha fishing lake known originally as the 'borrow pit'. This lake was formed by the excavation of material required to form the 'blast mounds' within the ROF. It has been used as a fishing lake for a number of years and is surrounded by swathes of self-seeded vegetation.
- 14.6.18 Extending from the main body of the Site are two notable spurs; one being the reed bed extension towards the Huntspill River, and the other the disused and overgrown railway line connection.
- 14.6.19 There are also two existing tracks that lie within the Site; one leading to Crockers Hill in Woolavington and a second leading from Rookery Close in Puriton. These are both rural tracks with managed hedgerows on either side. Neither is designated as a Public Right of Way (PRoW).

Historic Context

- 14.6.20 Refer to **Figure 14.6 and 14.7, Appendix 14.1**.
- 14.6.21 The large proportion of the former ROF sits within the drained landscape, with a network of rhynes and is highlighted as being 'Probably late 18th Century enclosure' within the SLA, which states:
- "By 1770 nearly two thirds of all the floodable land on the Levels and Moors was still unreclaimed but by 1840 almost the entire area has a system of drainage channels and was enclosed by rhynes"* (para 2.20).
- 14.6.22 The 1931 OS map shows a typical network of rhynes forming predominantly rectilinear shapes. Running across the north eastern corner of the Site and along the northern boundary is Black Ditch which is identified in the SLA as an '*Early pre-enclosure feature created or influenced culturally*', for a stretch of its length it forms the parish boundary.
- 14.6.23 The track linking Puriton to the former ROF is shown on the 1931 map, data is not available for the land immediately to the west of Woolavington, albeit it seems likely that the track linking to Woolavington from the former ROF would have also been in existence at the time.
- 14.6.24 With the advent of the former ROF the landscape changed from agricultural to industrial in nature. However, a significant number of the original ditches were retained. To the north of the ROF, the Huntspill River was constructed to serve as a reservoir to the factory. This wide, man-made drainage channel, which links to the Bristol Channel some 5 km to the west, is controlled by sluice gates to prevent tidal inflow. It is linked to the drainage system of the ROF by a series of reed beds, constructed at the same time. The 'borrow pit' on the Site's eastern boundary would also have been formed during this period.
- 14.6.25 The south eastern corner of the former ROF and the land rising up over the Polden Hills is considered by the SLA to be 'Probably Medieval or earlier'. This higher, and consequently

drier, land is quite different in nature with smaller and more irregular field shapes, more trees and number of blocks of woodland.

- 14.6.26 As well as the growth of the villages of Puriton and Woolavington, there are a number of obvious Twentieth and Twenty-first Century additions to the landscape in the immediate vicinity. The most prominent of these is the M5, which runs to the west of the Site but also the network of pylons which is prominent in the low lying landscape, and, although less visually intrusive, the solar park on the Site's western boundary.

2032 Baseline

- 14.6.27 The description within the 'Current State of the Environment' relates to current conditions on the Site in 2021 and enables a full understanding of the Site's recent, and more distant, history. However, with reference to current conditions, this LVIA will consider the effects of the Proposed Development compared to a 2032 baseline to reflect the changes that are due to take place on the Site and within its immediate vicinity in the years up to 2032. In 2032, it is assumed that:

- The extant 2017 Planning Consent for Huntspill Energy Park would have been constructed, along with the maturing planting proposals (in place for 11 years);
- The approved Village Enhancement Scheme would be completed, providing an off-road permissive path between the villages of Puriton and Woolavington for walkers and cyclists;
- Two emerging residential Approved Developments (one on the edge of Puriton and one at Woolavington) would be completed (maximum heights assumed at 11.5m for 2-2.5 storey houses which are referenced in the applications for both sites); and
- The Hinkley connection project pylon run would be complete.

Landscape Character – National Level

- 14.6.28 It is assumed that the National and District Level landscape character area background will not change between 2021 and 2032.
- 14.6.29 The Site lies within National Character Area (NCA) 142 – 'Somerset Levels and Moors'. This vast area encompasses; *"flat open landscape of wet pasture, arable and wetland divided by ditches and rhynes, often forming a chequer-board pattern, that clearly illustrate the reclaimed, planned nature of the landscape"*, and also notes; *"The M5 motorway and railway lines run north-south, linking several of the larger towns, including Weston-super-Mare and Bridgwater. Incremental development and industrialisation from the towns is evident"*. The Site occupies a very small part of this extensive area, and in 2032 much of the Site would already be occupied by the 2017 Planning Consent, therefore, this NCA will not be considered further within the LVIA.

- 14.6.30 The area immediately to the south covering the Polden Hills, lies within National Character Area 143 'Mid Somerset Hills'.

Landscape Character – District Level

- 14.6.31 Refer to **Figure 14.4, Appendix 14.1**.
- 14.6.32 Sedgemoor Landscape Assessment and Countryside Design Summary 2003 (SLA) identifies the Site as being within the **(c) 'Levels'** a sub category of **'4. Levels and Moors'** described as:

“A vast area of drained wetland which lies at or below the level of high tide in the adjacent Bristol channel.” (para 4.1)

- 14.6.33 The SLA identifies the nearby Polden Hills area, within which the Gravity Link Road is located, as being within the “**Polden Hills**” a sub-category of “**6. Lowland Hills**”, which are described as follows:

“Rising out of the low and wetland landscape of the Levels and Moors, are a series of hills and isolated knolls which have a close association with the wetlands both visually and historically” (para 6.1)

- 14.6.34 The SLA describes the Levels as being a:

“largely flat landscape with a pattern of fields defined by a combination of drainage channels and hedges”. (para 4.50)

- 14.6.35 The pattern of drainage ditches is considered:

“much less regular (than the Moors) and it is noticeable that many of the major local drainage channels or rhynes take a sinuous course. This is thought to be a consequence of the gradual process of reclamation which began in prehistoric times and which took the driest ground first and worked with an area’s natural edges and drainage channels” (para 4.50)

- 14.6.36 This drainage ditch observation appears particularly pertinent/applicable to the landscape to the north of Puriton and the west of the Site where the principal drains meander northwards.

- 14.6.37 The SLA notes:

“Hedgerows are widespread throughout the Levels, except in the open coastal areas and contain a wider range of species than the Moors, with willows still common but many other hedgerow trees. A number of more ornamental tree species, especially the coniferous, stand out in the landscape and contribute towards the creation of a more inhabited and civilised character than on the Moors”. (para 4.53)

- 14.6.38 Contrary to the SLA, the site survey undertaken as part of this LVIA found the network of hedgerows, within and around the Site to be weak and gappy. This field survey observation is reinforced by an examination of the aerial photographs of the Site and its environs which shows little or no hedgerow network to the west and north-west of the Site and to a slightly lesser degree to the north and north-east. The hedgerow system was found to be more robust to the south of the Site and on the rising ground of the Polden Hills (Polden Hills Landscape Character type).

- 14.6.39 The SLA notes under the heading of ‘Sensitivity to visual impact and capacity for new development’ (pg 46) that the flat nature of the levels strongly influences both the perception of it from higher viewpoints e.g. the Lowland Hills, and views and vistas within it. It notes:

“in the traditional Levels landscape church towers were the only significant landmark buildings and other buildings, which were generally no more than two storeys high, were normally not visible at any great distance”. (para 4.60)

- 14.6.40 Of the Site and its former use, the LCA notes:

“The issue of scale is particularly relevant in this flat landscape and structures such as electricity pylons, the armaments factory at Puriton and the former milk-processing factory at Bason Ridge demonstrates the more intrusive impact of tall buildings. The larger modern agricultural buildings and industrial units can also tend to be locally prominent due not only to scale but also colour of materials.” (para 4.60).

- 14.6.41 As defined in the methodology in terms of landscape value, The SLA 'Levels and Moors' Landscape Character Area would constitute a *'Moderately valued landscape in fair condition which makes some positive contribution to the local landscape character. Elements are replaceable but their replacement would take some time'*, and would therefore be ascribed a medium value. In terms of susceptibility it would be considered medium as, *'The receptor is partly able to accommodate the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer some opportunities for accommodating the change without those key characteristics being detrimentally altered.'* SLA 'Levels and Moors' LCA is therefore considered to have a **'Medium'** level of Sensitivity.
- 14.6.42 The northernmost part of the reedbed spur of the Site linking to the Huntspill River extends into the SLA sub category 'Clay Moors', however, due to the very small area affected and the limited changes proposed for this area (which would relate only to maintenance of the reed beds), this sub category is not considered further in this LVIA.
- 14.6.43 As the Gravity Link Road to the A39 runs through the **'Polden Hills' Lowland Hills** Landscape Character Area, and the southernmost part of the Site is located within it, this assessment will consider the potential landscape and visual impacts on this character area. The Gravity Link Road forms part of the 2032 baseline and therefore will not need to be assessed. The 'Polden Hills' are designated in the SLA as 'Visually prominent areas of high quality landscape', stating:
- "The visual prominence of the Polden Hills and the variety and richness of its landscape promotes it as a high priority for conservation. In particular, the western end of the hills and the south hillocks have a high value in terms of views from lowland areas."* (para 6.47)
- 14.6.44 It is worth noting, that at the time the SLA was written, the Gravity Link Road was not in existence, and there have been some changes to the characteristics of this area as a result which are evident in the descriptions. The SLA describes the Polden Hills as:
- "a long, low ridge which cuts across the Somerset Levels and Moors. Within Sedgemoor the ridge reaches a maximum height of 98m AOD. The topography is variable, with steeper slopes and hillocks to the southern side of the ridge, and shallower gradients on the northern side leading gently down to the moors."* as (para 6.37)
- "Clay soils and gentler gradients have allowed a variety of agricultural usage, including arable and permanent pasture or grass leys in a pattern of either large fields within flailed Hedgerows and few mature trees or smaller fields with nature hedgerows which are predominantly pasture. A patchwork of small but visually dominant blocks is an important feature of the southern side of the hills in particular, with one area of commercial forestry. Deciduous woodland is a key feature of the ridge along the A39."* as (para 6.38)
- 14.6.45 The SLA summarises the Polden Hills appraisal with:
- "The area is a rich tapestry of landscape with frequent long views, over the Levels and Moors to the other hill areas, creating a very high quality landscape character area."* (para 6.40)
- 14.6.46 In addition to the Polden Hills a number of other 'hills and isolated knolls' are identified within the SLA, and while these would not be directly impacted by the proposed development some have an inter-visibility with it and are thus included in this assessment. They are described as:
- "typically rolling, board profiles, with some steeper slopes...A pattern of small field with mature hedgerows is typical in the steeper hill areas, with larger fields on the gentler slopes."* (para 6.3)

- 14.6.47 As defined in the methodology in terms of landscape value, the Polden Hills would be considered a '*Landscape with highly valued physical attributes/elements (e.g. mature woodlands and/or trees) in fair condition or moderately valued elements (e.g. trees that contribute less positively to the local landscape) in good condition that make a positive contribution to local character and sense of place*' and would therefore be ascribed a high value. In terms of susceptibility, the Gravity Link Road is considered part of the baseline and therefore, '*the receptor is partly able to accommodate the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer some opportunities for accommodating the change without those key characteristics being detrimentally altered, resulting in a medium susceptibility.*' SLA 'Polden Hills' within LCA Lowland Hills is therefore considered to have a '**High**' level of Sensitivity.

Within the wider area, beyond the Polden Hills, a number of small hills and knolls rise from the Levels landscape, including Pawlett Hill and Brent Knoll which are referred to in this LVIA as LCA **Lowland Hills (wider area)** as a means of distinguishing between the Polden Hills and those hills further afield. These are described in the SLA as follows:

"Rising out of the low and wetland landscape of the Levels and Moors, are a series of hills and isolated knolls which have a close association with the wetlands both visually and historically" (para 6.1)

- 14.6.48 As defined in the methodology in terms of landscape value, The 'Lowland Hills' (wider area) including Pawlett Hill and Brent Knoll would be considered '*Landscape with highly valued physical attributes/elements (e.g. mature woodlands and/or trees) in fair condition or moderately valued elements (e.g. trees that contribute less positively to the local landscape) in good condition that make a positive contribution to local character and sense of place*' and would therefore be ascribed a high value. In terms of susceptibility, '*the receptor is partly able to accommodate the type of development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer some opportunities for accommodating the change without those key characteristics being detrimentally altered, resulting in a medium susceptibility*'. SLA 'Lowland Hills' (wider area) LCA is therefore considered to have a '**High**' level of Sensitivity.

- 14.6.49 There are two Areas of Outstanding Natural Beauty within a 17 km radius of the Site, **The Mendips and the Quantocks AONB**. The SLA describes Mendips as:

"a dramatic landscape, rising from the low and flat landscape of the Levels, through a narrow bank of fertile farmland and settlement, to the steep scarp face with deciduous woodland, enclosed pastures, open heath and downland and a relatively bare plateau skyline." (Para 5.1)

- 14.6.50 It goes on to describe the Quantocks AONB as a ridge that:

"creates a dominant landform at the southwestern edge of the District, creating a spectacular backdrop to the Levels and Moors landscape" (para 7.4)

- 14.6.51 As a result of a very high value as AONBs are noted in the methodology to be '*Landscapes with characteristics and attributes that have been identified as of national significance*' and a medium susceptibility, both these areas are considered to have a '**Very High**' level of sensitivity

Local Landscape Character Areas

- 14.6.52 Refer to **Figure 14.5, Appendix 14.1**.

- 14.6.53 The Local Landscape Character Areas have been defined for this assessment by The Richards Partnership in accordance with good practice as stated in paragraph **14.5.9**.

CA 1 – Former ROF Site (Within the ROF fence)

- 14.6.54 This area lies within 'Area 4.c The Levels' of the SLA. However, given its history and use, and its distinctive appearance, it is appropriate to describe this area as having an individual landscape character different to that of its surroundings.
- 14.6.55 At the time of writing in 2021, the majority of the demolition and remediation works have been completed (in November 2020), subsequent to receiving planning permission in March 2012, and whereas the character of this area was previously dominated by a series of disused, industrial buildings around the entrance area (with a limited number of buildings reaching 36.26m AOD and chimneys reaching 43.74m AOD), these are now predominantly demolished and levelled. There remain a number of ditches which have survived from its earlier use as reclaimed farmland but these have been severed in places to make way for its later industrial use. The tall processing plant which gave part of this area an industrial character has now gone, although the impression of a derelict industrial Site remains. Moving out from the centre of the Site beyond the managed areas to the north and east, the character changes to an agricultural landscape.
- 14.6.56 In 2021, the former ROF's influence over its adjacent landscapes is in a transitional stage. However, the trees, scrub and hedgerows within and around it play a strong role in how the Site and the landscape is viewed and perceived, with many playing a clear role in screening the Site. The most significant blocks of planting are outlined in **Figure 14.2: Existing Landscape Site Features and Conditions, Appendix 14.1**.
- 14.6.57 Following the 2017 Planning Consent, by 2032 this CA would be again populated by large scale industrial buildings up to 20.85 m AOD (15 m high) with stacks and yard areas, and some parts towards the north retained and managed for nature conservation. The Hinkley Connection Project T-pylons would be visible from the CA, running just to the east, and the Gravity Link Road corridor leading southwards to link to the A39. The structure planting would have 11 years growth, and would be starting to soften and filter views towards and within the CA.
- 14.6.58 In 2032, following the completion of the 2017 Planning Consent, the overall character of the area would be that of a busy industrial site, quite different to its immediate surroundings of agricultural land and villages. Whilst there are a number of trees/woodland blocks of note, and the new planting and ecological area management would be beginning to mature, the area overall would be considered of low value, and low susceptibility and is therefore ascribed a level of '**Low**' sensitivity.

CA 2 – Moors and Levels North of Woolavington

- 14.6.59 This area is typical of the flat agricultural landscape described in both National Character Area 142 and the 'Clay Moors' character area described in the SLA which occupies much of this area. The area is dominated by medium sized rectilinear fields divided by rhynes and hedgerows. The fields are predominantly pasture, and at the time of writing in 2021 were either given over to grazing or a hay crop. The hedgerows have a strong component of willow, many of which have been allowed to mature and form attractive features in the wider landscape.
- 14.6.60 The network of lanes follows the rectilinear pattern created by the ditches, with verges often edged by ditches vegetated by reeds. The straight nature of the roads means that, vehicular traffic is often travelling at speed, although the traffic flow is not heavy.
- 14.6.61 While this could be described as an expansive and open landscape, the flat nature of the land means that the hedgerows and trees often preclude long views across the wider area. There is, however, a visual relationship with the higher ground on the Polden Hills to the south.

- 14.6.62 The north of this character area is dominated by the Huntspill River National Nature Reserve (NNR). It runs in a straight line, in an east-west direction and has man made berms on either side. While this is physically a large feature in the landscape it is surprising well hidden from view, with the exception of the long vistas from the flat road bridges that cross it.
- 14.6.63 The other dominating man-made feature of this landscape is the network of electricity pylons that cross the area. In these flat landscapes they stand out on the skyline and are visible from some considerable distance, albeit the north-south pylon run is due for removal. At the time of writing in 2021 the new T-pylons for the Hinkley Connection Project are under construction, with a network of temporary haul routes alongside running from access points on the Causeway.
- 14.6.64 Some parts of the Site extend within this CA; the reed beds to the north, and a small area to the east of the Site which includes the fishing lake. By 2032, the 2017 Planning Consent would be constructed and there would be views towards its industrial buildings from the northern, southern and western parts of this CA, along with some limited noise and activity perceptible which would influence character, slightly reducing its tranquillity. The new T-pylons would run through the landscape (the other north-south pylons would be removed) and structure planting along the Site's northern and eastern edges would be maturing, beginning to soften and filter views of the buildings.
- 14.6.65 Despite the strong influence of Twentieth Century man-made features in this landscape and the noise from the motorway, it remains an attractive landscape, and parts of the area further east are relatively tranquil. While there can be no doubt that the buildings of the 2017 Planning Consent and the pylons detract from the overall intrinsic quality so that this area is considered to be of medium value, some small parts of the Site extend within this CA, and some areas have an intervisibility with it, and it would therefore be considered of medium susceptibility to the type of development proposed, resulting in a '**Medium**' level of sensitivity.

CA 3 – Levels and Moors Adjacent to the M5

- 14.6.66 This area lies within 'Area 4.c The Levels' in the SLA. It has many of the same characteristics as CA2, it is flat in nature and given over to pastoral farmland within a similar network of rhynes and hedgerows as previously described and a similar predominance of pylons and masts. The over-riding feature in this character area is the M5 Motorway which runs through the middle of the area in a north-south direction. As the main artery linking the south west with the rest of the country, this carries a constant stream of traffic throughout the day and night, which, given the flat nature of the landscape, is both aurally and visually intrusive. The visual relationship with the M5 has been highlighted in the SLA which has identified a swathe of land approximately 1 km either side of the motorway as being an area of 'High Sensitivity in relation to road corridors', although this is due to the volume of people who are exposed to the wider landscape from this area, rather than the quality of the landscape along the M5 corridor. The assessment states:

"The M5 Motorway and the main line railway from Taunton to Bristol run through the Levels, and constitute important view corridors in terms of perceptions of the landscape". (para 4.61)

- 14.6.67 The mainline railway runs immediately to the west of, and parallel to, the motorway. Beyond the railway line is the Walpole landfill site.
- 14.6.68 Human activity, typical of an urban edge, is also in evident in the form of boarded up gateways and areas of fly tipping along Batch Road which lies to the west of the Site, and alongside the M5 Motorway.
- 14.6.69 Immediately to the west of the Site there is a solar park. While the photo-voltaic cells sit low in the landscape and are not visually intrusive, they contribute to the 'man-made' character of the area as a whole.

- 14.6.70 The Huntspill River NNR runs across the northern part of the CA, however, compared to the neighbouring CA2 this feature appears less dominant, given the context of motorway and railway lines running north-south.
- 14.6.71 The railway line spur and a small area close to the western boundary of the Site lie within this CA. By 2032, the industrial buildings and yards of the 2017 Planning Consent would be in place, along with the maturing structure planting and the managed ecological areas on the north western corner of the Site which lie within this CA. There would be views towards the buildings from some parts of this CA.
- 14.6.72 The overall character of the area is dominated by its function as an infrastructure corridor, and despite the pastoral fields and the river, the motorway remains the dominant influence, with its associated urban edge characteristics, and the area overall would be considered of low value. Some limited parts of the Site extend within this CA, and some areas have an intervisibility with it, however, despite this, given the context, it is considered of low susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Low'** sensitivity.

CA 4 – Land to the South of the Former ROF

- 14.6.73 This area lies largely within the 'Polden Hills' character area of the SLA, forming an area of transition alongside the SLA 'Levels' character area to the north. In 2021, this relatively thin strip of land at the foot of the Polden Hills between the former ROF and the Woolavington Road, whilst in use as pasture, has many of the human influences often associated with the urban fringe. The fields at the eastern edge of the character area are smaller than those in the surrounding landscape and several appear unmanaged or are given over to paddocks. The remnants of old orchards are also present in several of these fields. At the entrance area to the former ROF there are large areas of hardstanding with old bicycle shelters, a bus stop, the social club and sports fields. There is also a small area of land to the west of the former ROF entrance which has been paved over and is occupied by a number of small buildings and caravans. The entrance is lined by mature avenues of horse chestnut trees and a small number of residential properties and farms also front onto, and are accessed from this stretch of road, while the remainder of the area is given over to pastoral fields with the Hinkley Point T-pylons passing through the eastern part of the CA.
- 14.6.74 By 2032, the Gravity Link Road and roundabout would be in place, along with considerable blocks of structure planting which would be maturing 11 years after planting. Much of the rest of this CA would remain quite similar, since it lies predominantly outside of the 2017 Planning Consent boundary, and proposals for the area within it are largely limited to planting, and the Village Enhancement Scheme. Therefore, changes to character would be limited to the addition of the establishing planting proposals, and a slight increase in urban character as a result of the gateways, fencing and pathway associated with the VES, with views in some places towards the large scale industrial buildings of the 2017 Planning Consent.
- 14.6.75 Woolavington Road, while not excessively busy, is a fast moving road without any pedestrian footway. Given that the wider landscape is of an open and expansive nature, this small section of land is relatively introverted and lacks the same level of inter-visibility that is found in the wider landscape.
- 14.6.76 The Site covers the majority of this CA, and while predominantly rural in nature, it has a number of urbanising influences, in the form of the villages of Puriton and Woolavington, the Gravity Link Road corridor and roundabout junction to the A39, and the 2017 Planning Consent buildings. Therefore, overall the area would be considered of medium value, and of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Medium'** sensitivity.

CA 5 – Puriton

- 14.6.77 The village of Puriton sits at the foot of the Polden Hills immediately to the east of the M5 Motorway. The historic core lies on the lower ground around the church of St Michael and All Angels, and of relevance to the consideration of the Site, Manor Farmhouse (Grade II Listed building) lies on the northern edge of the village (for detailed information refer to **Cultural Heritage Chapter 16**). However, the greater part of the village is late Twentieth Century in a variety of styles, and has gradually grown up over the rising ground towards the junction with the motorway. Traffic is currently focused on the Woolavington Road travelling through the village up onto the A39, although this is likely to change as the Gravity Link Road becomes operational.
- 14.6.78 Subject to prevailing weather conditions, large parts of the village are influenced by the noise of the traffic on the M5 which is a detracting factor in the village. When entering the village from the south, along Hillside, the village is seen within the context of the remediated former ROF in the background.
- 14.6.79 In 2032, once the Gravity Link Road is in full use, there will be some noise and movement perceptible to the south and east of the village from this new route, although this will be largely mitigated by the bund and structure planting along the route, which would be maturing after 11 years of growth. There would be a new residential development located on fields at the eastern edge of the village along the road corridor (refer to **Figure 14.5, Appendix 14.1**). In addition, there would be views across the 2017 Planning Consent buildings from some eastern parts of the village.
- 14.6.80 The overall character of the CA, which lies to the south west of the Site, is that of an attractive, well maintained village. This character area is urban in nature, and this is further reinforced by the influence of noise and views towards the M5, the roundabout junction with the Woolavington Road, and views towards the 2017 Planning Consent buildings. Therefore, overall the area would be considered of medium value, and of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Medium'** sensitivity.

CA 6 – Woolavington

- 14.6.81 The village of Woolavington is geographically close and similar in nature to Puriton. The historic core also lies on the lower ground within which there is a cluster of Listed Buildings, although these are set within the built up area of the village (for detailed information refer to **Cultural Heritage Chapter 16**). The more modern, late Twentieth Century/Twenty First Century housing has expanded up the hillside onto the higher ground to the south, thus giving it a greater inter-visibility with the flat, agricultural landscape below. As with Puriton, overall the village is attractive with mature, and generally well-maintained gardens. Woolavington has a slighter quieter and more peaceful character, however, due to its distance from the M5 and the A39 road corridor.
- 14.6.82 In the past, the western edge of the village had an intervisibility with the former ROF and by 2032, would have an intervisibility with the 2017 Planning Consent buildings. These views would have an influence on character, introducing large scale buildings into the otherwise rural setting of the village. Associated structure planting would also be beginning to become apparent after 11 years growth. Three new housing developments would be located on fields at the edge of the village extending its boundaries; the most pertinent to the landscape and visual consideration of the Site located on the western village edge, as shown on **Figure 14.5, Appendix 14.1**.
- 14.6.83 The overall character of Woolavington is that of an attractive, well maintained village. This character area is urban in nature, and views towards the 2017 Planning Consent buildings would further reinforce the urban characteristics of the village. Therefore, overall the area would be considered of medium value, and of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Medium'** sensitivity.

CA 7 – The Polden Hills

- 14.6.84 The Polden Hills are identified as a character area in their own right in the SLA. They form a prominent and attractive low ridge of land running in an east west direction overlooking the low lying landscape and have a strong visual relationship with the surrounding countryside. The hills are also identified in the SLA as being included within '*Visually prominent areas of high quality landscape*.' The change in character between the hills and the surrounding low lying landscape is also recognised in the National Character Areas, the hills falling within NCA 143 – Mid Somerset Hills.
- 14.6.85 This local character area considers a smaller area of land including the hills' northern face between the villages of Puriton and Woolavington which has the strongest relationship to the Site. The attractive pastoral character of this hillside to the north of the ridge is influenced by views across the Site and the electricity pylons that transverse the area west of Woolavington.
- 14.6.86 In terms of context, the southern side of the hills are steep in nature with a number of blocks of deciduous woodland, and the busy, and fast moving A39 forming a dominant and detracting feature. The northern hillside has a shallower incline, and comprises an attractive mixture of deciduous woodland and managed farmland, dissected by a network of well-used public footpaths. The rectilinear blocks of woodland tend towards the ridge and the steeper ground, while the shallower slopes are mainly given over to pastoral use. The fields are divided by mature, managed hedgerows with a number of mature individual trees.
- 14.6.87 Whilst there is a good deal of human activity and modern influence on the low lying landscape below, all of which is evident from the hills, the character area of the hills themselves is relatively quiet and tranquil. The exception to this is the noise from the M5 and A39, which is apparent particularly from the western end of the ridge.
- 14.6.88 In 2032, the Gravity Link Road would be fully functioning, resulting in some further loss of tranquillity at the western end of the ridge, and the structure planting associated with it would be maturing after 11 years of growth, softening and filtering views. The buildings of the 2017 Planning Consent would be visible from many locations on the hills, however, they would sit well below the skyline, in the context of the flat, agricultural landscape, from these elevated viewpoints. Structure planting to the south of the 2017 Planning Consent would be maturing, although, from these elevations would be unlikely to screen views towards the buildings. There would be views towards the Hinkley Point T-pylons, which pass across the ridge and down across the flat, agricultural landscape to the north. The new residential developments at Puriton and Woolavington would also be visible from some locations, further increasing the proportion of the view occupied by built form, and therefore influencing landscape character, particularly in 2032 before planting proposals have had time to mature.
- 14.6.89 This ridge has many attractive and high quality characteristics and has a strong inter-visibility with the flat, agricultural landscape below, so that despite some detracting influences in views from the hillside to the north in the form of the 2017 Planning Consent, and numerous pylons, this is considered a high quality landscape, as identified in the SLA. Therefore, overall, the area would be considered of high value, and of high susceptibility to the type of development proposed, and it is therefore ascribed a level of '**High**' sensitivity.

Visual Context

- 14.6.90 The landscape of the Site and the surrounding area is predominantly flat, sitting at a level of between 5m and 10m AOD, although the Site starts to rise gently to the south, towards the Woolavington Road and Polden Hills beyond. The Polden Hills rise to a level of approximately 70m AOD at the ridge to the south of the Site. As a result of this elevation, these hills are visually prominent in the wider landscape and there are wide, panoramic views from the hills across the flat, agricultural landscape, contained to the north by the Mendip Hills and the south west by the Quantock Hills. The landscape is predominantly rural but there are a number of visually prominent human influences, namely the M5 motorway, a

number of towns and villages, various large scale industrial sheds and the network of electricity pylons that cross the countryside.

- 14.6.91 The Zone of Theoretical Visibility (ZTV) Study (**Figure 14.8, Appendix 14.1**) was undertaken to help inform the visual assessment. The computer-generated model does not take into account intervening vegetation or built form, and in this instance, the intervening vegetation, and built form in places, greatly limits the number of publicly available viewpoints. However, this desk-based study was used as a starting point from which roads, footpaths and publicly accessible places around the Site were visited to establish from where the Proposed Development would be either partially or wholly visible. From this, a selection of representative viewpoints, both close up and distant, were selected for inclusion within this assessment in order to demonstrate the visual role the Site plays within its immediate surroundings and the wider landscape.
- 14.6.92 Visual impact relates to the changes that the Proposed Development would have upon views as experienced by the public. The people within the study area who may be affected by a change in view or in visual amenity are referred to as 'visual receptors'. Where possible the relative number of people who experience a view or series of views are noted in the text. It is not practical to assess every viewpoint and therefore the views selected for inclusion as part of this assessment are representative of those available to the public looking towards the Site from the surrounding area. These range in distance from within the Site to 17 km from the Site, albeit in some of the more distant views, it is difficult to 'pick out' the Site with the naked eye.
- 14.6.93 The selected viewpoints have been agreed with SDC's landscape officer as being representative of the views of the Site from the surrounding area and the photomontage locations were also discussed. The photographs were taken during winter months when the trees were not in leaf, in order to consider the worst-case scenario. However, it should be noted that screening from vegetation would be much increased from many locations during the summer months, when the trees are in leaf. The location of the viewpoints is shown on **Figures 14.9 and 14.10**, with the photoviewpoint sheets on **Figures 14.11-14.28. Figure 14.29, Appendix 14.1** illustrates the local landscape features, viewpoints and vistas experienced by visual receptors and the photomontages are shown on **Figures 14.30-14.49 Appendix 14.1**. For ease of reference, the term 'Main Site' has been used to refer to the main body of the Site, excluding the spurs for the rail link and the Gravity Road Link.

**Viewpoint A – View looking south east from the M5 adjacent to the Huntspill River (1.2 km from main Site boundary, 400 m from rail facilities extension Site boundary)
Photomontage Viewpoint**

Visual Receptors: Motorists on M5

- 14.6.94 This view is taken immediately adjacent to the M5 as it crosses the Huntspill River some 1.2 km to the north west of the main Site area (excluding the rail spur). It is of a flat, open, rural landscape eventually giving way to the Polden Hills some 3.5 km to the south. The Site is visible in the middle distance, with the block of poplar woodland in the Site's north west corner clearly visible. To the east of this, the buildings of the 2017 Planning Consent would also be discernible, below the skyline. The villages of both Puriton and Woolavington are visible at the foot of the Polden Hills, with the Gravity Link Road corridor just visible rising up the ridge.
- 14.6.95 This is an attractive, open, agricultural landscape seen, albeit briefly, by many people each day. However, the motorway itself is a dominant feature and the pylons and communications masts that run across the landscape are also highly visible. It should be noted, that for motorists travelling south along the M5, most views of the Site are screened by intervening vegetation and this view is representative of a short stretch of road between the Huntspill River and Junction 23.

- 14.6.96 Ordinarily visual receptors such as motorists or passengers travelling at speed are considered to have a 'Low' level of sensitivity (Refer to **Table 14.6: Visual Sensitivity Criteria**). However, in this instance the SLA and Countryside Design Summary identifies a number of principal road corridors throughout the district as "Areas of high sensitivity in relation to road corridors." These corridors are seen as important, in that they afford high numbers of people views of the district's attractive landscape. Therefore, in accordance with the methodology, and in consideration of the SLA, overall, for visual receptors the view would be considered of medium value, and receptors of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint B – View looking east towards the Site from Batch Road (500 m from main area Site boundary)

Visual Receptors: Motorists, pedestrians/cyclists

- 14.6.97 This view is available to motorists and pedestrians using Batch Road which runs in a north-south direction approximately 450 m from the main Site's north western boundary. While Batch Road carries a relatively small amount of traffic, similar views would be available to the many travellers using the M5 which sits on slightly raised ground some 30 m to the west (considered in Viewpoint A).
- 14.6.98 This viewpoint has clear, open views to the Site across the flat farmland in the foreground and solar park in the middle distance. The large stand of woodland in the north western corner of the Site is clearly visible and appears prominent in the wider landscape. However, much of the Site is screened from view by the lower level hedgerows and smaller blocks of trees along the western edge of the Site.
- 14.6.99 The flat nature of the landscape means that there are clear open views over the wider landscape, however, to the south the view is enclosed by the ridge of the Polden Hills, while to the north most views are precluded by intervening trees and hedgerows. A prominent network of electricity pylons is visible from this point.
- 14.6.100 The solar park immediately to the west of the Site is partially obscured by intervening vegetation, although it is possible to pick out some of the solar panels above the hedge line.
- 14.6.101 This view is available to the users of Batch Road, including motorists, walkers and cyclists on the narrow lane. It is a relatively attractive rural landscape, albeit there are a number of detracting influences in the form of the network of electricity pylons, the solar park and glimpses of the 2017 Planning Consent buildings.
- 14.6.102 Therefore, in accordance with the methodology, given the relatively small number of people travelling along this road and the detractive influence of the pylons, large scale built form and the solar park, overall, for visual receptors the view would be considered of low value, and of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Low'** sensitivity for motorists, and **'Medium'** for pedestrians.

Viewpoint C – View looking north towards the Site from Woolavington Road (within the Site boundary)

Visual Receptors: Motorists

- 14.6.103 This view is taken from the Woolavington Road as it leaves/approaches Puriton (approximately 350 m from the edge of the village) at the Gravity Link Road corridor roundabout, and would be experienced by motorists. It is largely comprised of the Gravity Link Road features in the immediate foreground, but beyond this, comprises the main part of the Site itself. There are a few derelict buildings still visible at the time of writing in 2021, and there is a large proportion of non-native conifers around the edge of the Site, that add to the slightly incongruous feel in this otherwise agricultural landscape.

- 14.6.104 In 2021, the skyline is mostly formed by vegetation in the foreground and middle distance, now that the large buildings and chimneys of the former ROF have been demolished. Beyond this, the skyline is formed by the Mendip Hills some 15 km to the north. A number of electricity pylons in the distance also break the skyline.
- 14.6.105 By 2032, vegetation in the foreground on the roundabout would be maturing, as would structure planting in the middle distance with 11 years of growth which would soften and filter views towards the buildings of the 2017 Planning Consent in the background, although these would be visible on the skyline in places, particularly during winter months.
- 14.6.106 Therefore, in accordance with the methodology, given the detracting influence of the urban features present in this view, overall, for visual receptors the view would be considered of medium value, with motorists of low susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint D - View looking north-east across the Site from the Woolavington Road adjacent to Martlands Farm (Adjacent to the Site boundary)

Visual Receptors: Motorists

- 14.6.107 This view is taken from the Woolavington Road adjacent to Martlands Farm as it approaches the village of Woolavington. From this viewpoint the open, expansive views so typical of the area are not available as they are screened by intervening mature hedgerows and belts of trees and the edge of the village. Views into this south eastern corner of the Site are largely agricultural in character, with glimpses of the village edge. At the time of writing in 2021 the Hinkley Connection Project was underway, with temporary works to facilitate the construction of T-pylons across this corner of the Site.
- 14.6.108 By 2032, the T-pylons would be in place and the edge of the large scale buildings within the 2017 Planning Consent would be visible, filtered by intervening existing mature vegetation, and, in addition, maturing structure planting delivered as part of the 2017 Planning Consent.
- 14.6.109 Therefore, in accordance with the methodology, given the relatively attractive rural and village edge character of the view, and despite the presence of the pylons, overall, the view would be considered of medium value, and motorists would be considered of low susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint E – View looking south west from the car park adjacent to The Causeway immediately to the south of the Huntspill River (800 m from Site boundary) – Photomontage Viewpoint

Visual Receptors: Motorists, anglers and walkers

- 14.6.110 This view is taken from a small car park immediately to the south of the Huntspill River which is predominantly used by walkers and anglers; a similar view is available to motorists travelling south along the Causeway. The view is of an open, flat agricultural landscape with the Polden Hills forming the skyline some 3 km to the south, and beyond this, to the south west, on clear days, the ridge of the Quantock Hills is also visible some 19 km away. In 2021 the Site is visible in the middle distance although the removal of large scale built form from the former ROF makes it more difficult to pick out, with the exception of the woodland in the north west corner.
- 14.6.111 In 2032, the large scale buildings of the 2017 Planning Consent would be visible but would not break the skyline, and would be partially screened and filtered by intervening existing mature vegetation, and in addition, the now maturing structure planting delivered as part of the 2017 Planning Consent. The other dominant features visible from this viewpoint are the large number of electricity pylons and communications masts which break the skyline,

including the T-pylons which would be clearly visible in the foreground, middle distance and background of the view.

- 14.6.112 Therefore, in accordance with the methodology, given the relatively attractive rural character of the view, and despite the pylons and glimpses of the large scale buildings, overall, the view would be considered of medium value, and walkers would be considered of high susceptibility, whilst motorists and anglers would be considered of low susceptibility to the type of development proposed as they would be more intent on their activity, it is therefore ascribed a level of **'High'** sensitivity for walkers and **'Medium'** sensitivity for motorists and anglers.

Viewpoint F – View looking west from the Causeway towards the Site (560 m from main Site boundary, 20 m to access point)

Visual Receptors: Motorists

- 14.6.113 This view is taken from The Causeway some 200 m to the north of the village of Woolavington. This is a flat, open rural landscape as previously described, and due to the flat nature of the land much of the wider landscape is obscured from view by intervening mature hedgerows and trees. As a consequence of this, the numerous electricity pylons sit proud in the landscape and form the skyline, detracting from what is otherwise an attractive rural scene. In 2021, the T-pylons are currently under construction in this area, and the works are clearly visible in the foreground view, along with the construction site cabins which are currently visible on the temporary haul road which follows the route of the pylons. The access visible immediately to the south is part of the Site.
- 14.6.114 In 2032, the T-pylons and other numerous pylons would remain dominant features on the skyline, however, some parts of the large scale buildings of the 2017 Planning Consent would also be visible in the middle distance, set within existing mature vegetation, and the maturing structure planting delivered as part of the consent.
- 14.6.115 The Causeway is a flat, relatively straight road and, while it is not especially busy, motorists tend to move at speed meaning this view would be both transient and also oblique.
- 14.6.116 Therefore, in accordance with the methodology, given the fairly attractive rural character of the view, and despite the numerous pylons, overall, the view would be considered of medium value, and motorists would be considered of low susceptibility to the type of development proposed. It is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint G – View looking south from Withy Road approaching East Huntspill. (1.9 km to the main Site boundary) - Photomontage Viewpoint

Visual Receptors: Motorists and residents

- 14.6.117 This view is taken from Withy Road and is intended to be representative of the views available to local residents within and around East Huntspill. This rural landscape is more well-vegetated than the land further south, and due to the flat nature of the land, much of the wider landscape is obscured from view by intervening mature hedgerows and trees. The numerous electricity pylons in the area are much less dominant in the view but are still apparent on the skyline, detracting slightly from what is otherwise an attractive rural scene.
- 14.6.118 In 2032, although the large scale buildings of the 2017 Planning Consent would be in place, there would be no change to this view, given the numerous layers of intervening vegetation.
- 14.6.119 Therefore, in accordance with the methodology, given the attractive rural character of the view, and despite the existing pylons, overall, the view would be considered of medium value, and residents would be considered of high susceptibility to the type of development proposed, and it is therefore ascribed a level of **'High'** sensitivity for residents and **'Medium'** for motorists.

Viewpoint H – View looking north from footpath BW28/2 to the east of Puriton (200 m from main Site)

Visual Receptors: Walkers and residents in the new residential development on the edge of the village occupying this location

- 14.6.120 This view is taken from the public footpath to the east of Puriton that runs from the Woolavington Road, crossing the Gravity Link Road corridor and connects with the bridleway that runs along the ridge of the Polden Hills. From this relatively low elevation (approximately 24 m AOD) many longer views are screened by intervening vegetation, albeit the Mendip Hills do form part of the skyline in the distance. In 2021, the lighting columns are visible along the Gravity Link Road corridor and there are glimpses of traffic on the roundabout, and beyond pylon runs extend across the lower ground. Vegetation can be seen on the southern parts of the Site, and the houses along the eastern edge of Puriton are partially visible to walkers as they travel north.
- 14.6.121 In 2032, the residential development proposed for the eastern edge of Puriton would be in place), and from this location would be likely to occupy the entire foreground view, screening any middle distance or background views. However, at this point, this view would be used as a representative viewpoint to consider the effects on the views of the residents that will occupy these homes. Residents, and local walkers further east on the footpath would experience some open views across the large scale buildings and yards on the 2017 Planning Consent. By this time planting associated with the Gravity Link Road corridor and structure planting around the 2017 Planning Consent would be starting to mature, and filter views, however, due to the elevated location, there would be partial views of built form on the Site in the background, as well as lighting columns along the Gravity Link Road corridor and glimpses of traffic on the roundabout, with pylon runs across the lower ground.
- 14.6.122 Therefore, in accordance with the methodology, given the combination of attractive rural character and urban edge features in the view, and despite the pylons and some large scale built form, overall, the view would be considered of medium value. The footpath appears to be well used by local walkers, who, along with local residents would experience some partial views across the 2017 Planning Consent and would be considered of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **‘Medium’** sensitivity.

Viewpoint I - View looking north from Bridleway adjacent to Home Covert (750 m from main Site boundary and approximately 250 m from Gravity Link Road) - Photomontage Viewpoint

Visual Receptors: Walkers and horse riders

- 14.6.123 This view is taken from the bridleway that runs along the spine of the Polden Hills. From this elevation (approximately 53 m AOD) there are wide expansive views over the flat, agricultural Somerset landscape to Brent Knoll and the Mendip Hills to the north and to the Bristol Channel in the west. The foreground comprises an attractive mixture of woodland and managed farmland, divided by mature hedgerows and trees.
- 14.6.124 The wider landscape is a hive of activity with the constant stream of traffic on the M5 clearly visible, the network of electricity pylons and communications masts and a number of large industrial sheds to the north west, all set in wider managed agricultural farmland. From this viewpoint the villages of Puriton and Woolavington are obscured by topography but in 2021 the central parts of the Site are clearly visible in the middle distance (although the Site now appears much less prominent in the landscape than when there were buildings on the ROF). Parts of the solar park are visible from this location adding to the general ‘urbanisation’ of the view.
- 14.6.125 By 2032, planting associated with the Gravity Link Road corridor would be maturing, and would start to increase the well vegetated appearance of the landscape, although much

would be hidden by topography. The large scale buildings of the 2017 Planning Consent would be partially visible on lower ground, set well below the skyline, although it is unlikely that the associated structure planting would be perceptible from the ridge.

- 14.6.126 Therefore, in accordance with the methodology, given that the Polden Hills are recognised for their high quality landscape and visual prominence and are popular with local walkers and riders, and despite the existing pylons, and other detractive elements in the view, overall, for visual receptors the view would be considered of high value. The route appears well used by local walkers which would be considered of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **'High'** sensitivity.

Viewpoint J – View looking north from Hillside as it enters Puriton from the south (750 m from main Site boundary, 90 m from the Gravity Link Road)

Visual Receptors: Motorists, and walkers

- 14.6.127 This view is taken from Hillside road as it drops down from the A39 into the village of Puriton. Given its slightly higher elevation (approximately 47 m AOD) than the land to the north, wide panoramic views over the flat, agricultural Somerset landscape to Brent Knoll and the Mendip Hills in the far distance are available, albeit these are considerably curtailed during the summer months when the hedgerows have been allowed to grow.
- 14.6.128 In 2021 the edge of the village of Puriton is clearly visible in the foreground behind the Gravity Link Road, with the Site partially visible in the background forming a slightly discordant element in the backdrop to the village, as there are glimpses of the cleared areas. This is compounded by further infrastructure in the form of the M5 and the many electricity pylons traversing the flat, agricultural landscape. The solar park is clearly visible to the west of the Site and forms a strong element in the view from this location. Nonetheless it remains a relatively attractive, village edge view.
- 14.6.129 In 2032, structure planting associated with the Gravity Link Road corridor in the middle distance would be maturing after 11 years of growth, and this would obscure much of the view towards the main area of the 2017 Planning Consent, with the large scale buildings likely to remain just visible from this location, particularly during winter months.
- 14.6.130 Therefore, in accordance with the methodology, given that the village and the panoramic views beyond are relatively attractive, despite the pylons, solar park and glimpses of the large scale buildings of the 2017 Planning Consent in the view, overall, it would be considered of medium value. This access into Puriton affords pedestrians and motorists their first opportunity to view the wider panorama of the area. These receptors would be considered of medium susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint K - View looking north west from Crancombe Lane as it passes/enters Woolavington (440 m from Site boundary) Photomontage Viewpoint

Visual Receptors: Motorists, residents and walkers

- 14.6.131 This view is taken from Crancombe Lane as it drops down from the Polden Hills and enters the village of Woolavington. Given its slightly lower elevation, the views available from this location are not quite as far reaching as those from the spine of the hills. Motorists and walkers travelling southwards along Crancombe Lane get a few glimpses towards the Site during summer but during winter months views may be much more open, depending upon the hedgerow management regime.
- 14.6.132 This view, or one similar, is available to the residents of the houses that back onto Crancombe Lane, albeit this would generally be from upper floors, given that the majority of ground floor windows and gardens are screened by planting and fences.

- 14.6.133 In 2021, the view is predominantly of open managed farmland with medium sized fields divided by a network of mature hedgerows and trees, with some large farmsteads and dwellings on the edge of the village. There are a number of detractors in the form of electricity pylons, telegraph poles and the clearance works across the Site. In addition, the Hinkley connection Project T-pylons currently under construction will be clearly visible across this view.
- 14.6.134 By 2032, however, the view would have changed considerably, with the field to the right of the view occupied by a residential development extending the western edge of the village, and the large scale buildings of the 2017 Planning Consent clearly visible across the view, although filtered by mature vegetation in some places. Structure planting associated with the 2017 Planning Consent would be maturing after 11 years growth, however, this would have a limited influence on views at this stage and distance.
- 14.6.135 Therefore, in accordance with the methodology, given that the Polden Hills are recognised for their high quality landscape and visual prominence and are popular with local walkers, and despite the existing pylons, and other detractive elements in the view, overall, the view would be considered of high value. The lane appears well used by local walkers and the view is enjoyed by a number of Woolavington residents (including those within the new residential development) which, given the existing context, would be considered of medium susceptibility to the type of development proposed, (motorists would be considered of low susceptibility) and it is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint L - View looking east along the A39 to the south of Puriton (850 m from main Site, 0 m from the Gravity Link Road junction) Photomontage Viewpoint

Visual Receptors: Motorists, and a small number of residents

- 14.6.136 This view is taken from the southern edge of the A39 as it rises up from the motorway heading south eastwards and is typical of the view that would be available to motorists travelling along this fast moving stretch of road.
- 14.6.137 The main body of the Site is not visible from this location, being screened by the Gravity Link Road bund which is clearly visible in this view, and obscures all but a few tree tops beyond. A small group of houses are situated immediately to the south of the A39 at this point and residents would experience a similar view, although from upper floors there may be glimpses to Puriton village and the landscape beyond.
- 14.6.138 In 2032, the road corridor and roundabout would appear well vegetated and populated by young, maturing trees after 11 years growth, and in addition to the topography, this vegetation would be likely to obscure any views of the large scale buildings of the 2017 Planning Consent from the road and roundabout. However, from upper storeys of a small number of residential properties, some glimpses may be available of the flatter landscape to the north, set within the maturing structure planting.
- 14.6.139 Therefore, in accordance with the methodology, given that the A39 and the receptor location are not an 'Area of high sensitivity in relation to road corridors' as described in the SLA, and whilst the Polden Hills is identified as a 'Visually prominent area of high quality landscape' the road corridor itself is not considered to be a high quality landscape or visually prominent. The foreground view would generally be considered of low value, however, the view towards the flat, agricultural landscape to the north would be considered of medium value. The road is busy, and is relatively high speed and motorists would be considered of low susceptibility to the type of development proposed. The small number of residents would be considered of medium susceptibility, however, and it is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint M - View looking east from Pawlett (2.4 km from the Site)

Visual Receptors: Motorists, and residents

14.6.140 The view is taken from the A38, Bristol Road, at the edge of the village of Pawlett on slightly elevated land at the foot of Pawlett Hill. A similar view would be available from upper floors of some of the residential properties that back onto it and, obliquely, to motorists travelling along this fast stretch of road. From this location the skyline to the north is formed by the Mendips, while to the south east it is the Polden Hills, where it is possible to discern the rooftops of Puriton and Woolavington on the lower slopes. While the view is predominantly rural, the network of electricity pylons forms an obtrusive element in the wider landscape, as does the Walpole landfill site 1 km to the east. At this distance the Site forms a small part in a wide panorama, however, the larger Site tree groups are visible.

14.6.141 In 2032 it is not considered likely that any views of the 2017 Planning Consent buildings would be perceptible from this location.

Therefore, in accordance with the methodology, although close to an area of visually prominent landscape, the road corridor is not considered to be a high quality landscape or visually prominent, and given the presence of the landfill site and network of electricity pylons, despite some attractive farmland in the middle ground, the view would be considered of medium value. The road is relatively high speed and, motorists would be considered of low susceptibility to the type of development proposed, with the small number of residents considered of medium susceptibility, and it is therefore ascribed a level of **'Medium'** sensitivity.

Viewpoint N - View looking east from Steart Drove (Long distance trail BW25/3) (5.7 km from the main Site)

Visual Receptors: Walkers

14.6.142 The view is taken from Steart Drove, the single lane road that leads to Stert Point on the Bristol Channel. This flat and open landscape allows for expansive views across the lower lying land which are only constrained by the Mendips to the north and the Quantocks to the south. The Polden Hills form a low ridge in the middle distance, and, on a clear day, it is possible to discern Glastonbury Tor some 26 kms to the east.

14.6.143 From this slightly elevated stretch of road it is just possible to see the large block of trees in the north western corner of the Site, which form the skyline, and the pylons that run to the immediate north of the Site. However, these are all very small elements in a large panoramic. This was identified as the best available view in the locality, with that immediately to the west on the River Parrett Trail being obscured by Pawlett Hill. In 2032 it is not considered likely that any views of the 2017 Planning Consent buildings would be perceptible from this location.

14.6.144 Therefore, in accordance with the methodology, given that this is a long distance trail and the area is popular with local walkers and bird watchers, despite the existing pylons and other detractive elements in the view, on balance, the view would be considered of medium value. The location appears well used by local walkers and joggers, who would be considered of high susceptibility to the type of development proposed, and it is therefore ascribed a level of **'High'** sensitivity.

Viewpoint O - View looking north east from Lydeard Hill within the Quantocks AONB (17 km from the Site)

Visual Receptors: Walkers

14.6.145 The view is taken from the top of Lydeard Hill, adjacent to the Macmillan Way West national trail within the Quantock Hills Area of Outstanding Natural Beauty (AONB). It shows

expansive views over the flat landscape of Somerset, Bristol Channel and up to the Mendips some 35 km to the north.

14.6.146 It is possible to see the Polden Hill ridge in the middle distance sitting to the north east of Bridgwater. However, while it is just possible to see the north western part of the Site from this location, in reality, it is extremely difficult to pick out with the naked eye, and in 2032 it is not considered likely that any views of the 2017 Planning Consent buildings would be perceptible from this location.

14.6.147 Therefore, in accordance with the methodology, given that the AONB is recognised for its high quality landscape of national significance and this location is on a well-used national trail, despite the existing pylons and other detractive elements in the view, overall, the view would be considered of very high value. The hill appears very well used by walkers which would be considered of high susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Very High'** sensitivity.

Viewpoint P - View looking north from bridge above the M5 (5 km from the Site)
Photomontage viewpoint

Visual Receptors: Motorists

14.6.148 The view is taken from the A372 as it crosses over the M5 to the south of the Site. The Polden Hills ridge forms an attractive skyline, albeit there are a number of detracting elements to the view in the form of traffic, pylons and polytunnels. It should be noted that this view was selected before information on the maximum stack heights was available, however, it has been retained within this LVIA in order to demonstrate the screening effect of the Polden ridge in views from the south.

14.6.149 While slightly elevated above the motorway, this view demonstrates that for motorists travelling north, the ridgeline precludes any views of the Site from the south. This remains the case until the motorway emerges from the cutting associated with Junction 23, and in 2032 no views of the 2017 Planning Consent buildings would be perceptible from this location.

14.6.150 Therefore, in accordance with the methodology, the view would be considered of medium value, and motorists of low susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Low'** sensitivity.

Viewpoint Q - View looking south from Cross Plain on the Mendip Hills (15 km from the Site)

Visual Receptors: Walkers

14.6.151 There are any number of potential views from the Mendips Hills AONB looking south across the flat landscape below. The view from Cross Plain, immediately adjacent to the West Mendip Way national trail, was chosen as being representative, as it shows a vast panoramic view over the lower lying land and was considered representative of people's views across the hillsides. The Polden Hills are visible in the distance, albeit they do not break the skyline, which is formed by another ridge further to the south. From this point it is just possible to see the form of both Puriton and Woolavington as they rise up the lower slopes and as a consequence locate the main body of the Site, albeit to the naked eye it is not possible to discern individual features, and in 2032 it is not considered likely that any views of the 2017 Planning Consent buildings would be perceptible from this location.

14.6.152 Therefore, in accordance with the methodology, given that the AONB is recognised for its high quality landscape of national significance and this location is on a well-used national trail, despite some detractive elements in the view, overall, the view would be considered of very high value. The route appears very well used by walkers which would be considered of

high susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Very High'** sensitivity.

Viewpoint R - View looking south east from Brent Knoll (8.5 km from the Site)

Visual Receptors: Walkers

14.6.153 The view is taken from the top of Brent Knoll, an isolated hill fort rising to an elevation of 139 m AOD above the low lying landscape to the north west of the Site. From this location there are expansive, 360 degree views over the low lying landscape of Somerset from Bridgwater Bay to the west to Glastonbury Tor to the east. While the landscape is predominantly rural there are a number of urban influences, the most prominent of these being the movement of traffic along the M5 which passes the knoll approximately 2 km to the south east, and, in terms of built form, the large, light coloured warehouses in Isleport Business Park to the east of Burnham on Sea and Highbridge, approximately 3.5 km to the south.

14.6.154 The Polden Hills ridge is clearly visible, albeit it does not form the skyline from this vantage point. It is also possible to see the villages of Woolavington and Puriton sitting on its lower slopes on a clear day. The Site, some 8.5 km to the south east, is just discernible from this location. However, given the distance, in 2032, it is considered likely that the 2017 Planning Consent buildings on the Site would only just be visible.

14.6.155 Therefore, in accordance with the methodology, given that Brent Knoll is an ancient hill fort of national significance and is visited by many tourists, specifically to enjoy the views over the surrounding landscape, and despite some detractive elements in the view, overall, for visual receptors the view would be considered of very high value. The route appears very well used by walkers which would be considered of high susceptibility to the type of development proposed, and it is therefore ascribed a level of **'Very High'** sensitivity.

14.7 Embedded Mitigation

14.7.1 In line with guidance from the Institute of Environmental Management and Assessment (IEMA), the assessment will take account of Embedded Mitigation which is inherent in the design for the Proposed Development; this is taken from the suite of **Parameter Plans in Appendix 3.1**. In addition, a **Framework Demolition and Construction and Environmental Management Plan (FDCEMP)** (**Appendix 4.1**) and a **Design Guide** will be submitted with the LDO. This is secured through the Compliance Form.

14.7.2 The **FDCEMP** provides the mechanism for the protection of vegetation, and other landscape and ecological features to be retained during the construction and demolition phase.

14.7.3 The **Design Guide** comprises both mandatory principles and guidance, and is structured to consider the whole Site, within which a set of principles are outlined to provide a placemaking framework, mitigation and design principles. These are set out in the following structure and secured within the Compliance Form:

- Block Principles (principles that relate to a group of buildings and streets);
- Plot Principles (principles that relate to individual plots that are serving one particular use, including the Large Scale Manufacturing Area);
- Building Principles;
- Parking/Servicing;
- Colour Strategy;

- Streets (Green Routes/Pedestrian Street, Mobility Route, Entrance Avenue, Long Drauve);
- Key Edges and Boundaries (Puriton Edge, Woolavington Edge, Security and Boundaries, Plot Boundaries);
- Sense of Place/Design Drivers (Set within Landscape, Facing the Street, Long Drauve, Accommodating larger scale users, Connecting/Linking with Infrastructure);
- Placemaking Nodes (Arrival and Wellbeing Area, Mobility Hub and Train Station Square, Central Park, Gravity Park, Gravity Green, Gravity Plaza;
- Design Opportunities.

14.7.4 The key elements of mitigation which fit within this structure, and embedded mitigation set out within the parameter plans can be summarised as follows for ease of reference:

- Disposition of the Proposed Development with the tallest built form located in the central part of the Site with the stepping down of building heights to the south, in reference to the scale of the Woolavington Road;
- The retention of existing vegetation around much of the periphery of the Proposed Development, and the structural tree and woodland planting proposed to help integrate built form into its surroundings;
- Making the most of existing landscape features. This could include rhynes, existing trees and hedgerows to create attractive environments. Design blocks to incorporate these features where possible to add interest and give a sense of maturity to the space from the start;
- A green edge to Woolavington Road; (considered within the Design Guide under Design Drivers, 'Set Within Landscape' this would ensure a minimum buffer with of 10m);
- Puriton Edge - A focus on landscape, sports and recreation along the western edge of the site as part of the Arrival and Wellbeing Area with key design principles:
 - Landscape buffer. There will be a landscape buffer along the western edge, with no built form within 15m of the edge of the LDO boundary.
 - Structural tree planting. Introduction of structural tree planting should also be considered to reinforce the landscape buffer and mitigate the visual impact.
 - Community open spaces. A focus on health and wellbeing and a place for the new and existing community to enjoy. Greenspaces could include allotments, tree nursery, sports pitches and recreational space.
 - Integrate existing features. Existing rhynes and vegetation will be retained where possible and new uses integrated into the existing landscape pattern.
- Woolavington Edge – Residential development in the eastern part of the Campus will form an extension to the village of Woolavington. The development will therefore need to appropriately respond to the existing properties that back or side onto the Site. Key design principles:
 - Complete the block. Use development to enclose the rear boundaries of properties adjacent to the Site, with a minimum setback of 20m from rear frontages.

- Respecting context. Use a similar scale and massing of development along the existing rear edge.
- Collectively, a green edge to Woolavington Road, Gravity Park, Central Park and the Arrival and Wellbeing Area would enhance the perception of a distinct edge to the separate villages, and break up the Proposed Development from elevated viewpoints;
- Greenspace provision to incorporate opportunities for biodiversity;
- East-west landscape corridor and micromobility connections including pedestrian and cycle routes;
- Positioning of residential accommodation at least one block away from the larger scale buildings. Accommodation should generally be positioned at least one block away from the large-scale manufacturing uses, with non-accommodation uses (office/etc) as a transition between the two. Where residential uses are positioned closer than one block use landscape, such as woodland planting, to create a buffer. Visual effects to the commercial areas will be managed as/when the more residential/smaller scale development comes forward and advanced buffer planting should be considered as part of the sequencing and phasing of larger scale commercial development in order to soften views towards it from later phases of development, in particular residential accommodation, and to ensure integration and assimilation into the wider landscape and overall objectives at Gravity. Site specific and site-wide landscape proposals will be required through the compliance application process, and controlled through a requirement within the Design Guide and set out in the Compliance Form.
- Plot boundaries – Perimeter Boundary Treatment and Use of Landscaping
 - The perimeter boundary treatment should be carefully considered in relation to thresholds, views and sitewide security requirements.
 - The use of dense native hedging and rhynes as natural barriers is preferred where possible.
 - Structural planting and woodland clusters should be used in key locations to provide a buffer between contrasting uses such as between larger scale employment uses and residential accommodation, and/or between large scale employment uses and important landscape areas.
 - Planting can also be useful to screen unattractive uses such as the water treatment works, or the energy storage areas.
- Landscape Character/Sense of Place within the Site;
 - Set within Landscape (Naturalistic landscape character, a varying width to the greenspace will help create a more natural feel to the space. Landscape features could include rhynes / SuDS, trees and hedgerows and walking and cycling routes. Opportunities for glades and pockets of grassland. Room-like spaces between buildings, creating social pockets and contemplative spaces with picnic tables, play elements, art, quiet reading spots. Careful use of landscape and lighting to harmoniously display built form in the landscape).
 - Facing the Street (Formal landscape character - Tree lined, wide planted verges, incorporating rhynes, a public open space (central park), woodland blocks set within commercial development parcels to provide a buffer to residential areas. Incorporate rhynes / sustainable drainage systems and public access routes where appropriate).

- Long Drauve (Important that landscape is used to positively enhance the route and reduce visual impact of built form or vehicular routes. Use of landscape to provide visual interest and variety along what otherwise could be a monotonous route. Screen planting is an important characteristic. Dense planting and wider landscape verges are encouraged. Potential to use rhyme features as delineation of plot boundaries).

- Accommodating Larger Scale users (The new large scale character of built form in this area would create a distinct new character in this area, and it will be important to integrate this within the whole development, with the stepping down of built form in adjacent areas, and the use of architectural details to create a more varied an attractive roofscape and materials in common across adjacent areas).

- - Connecting/Linking with Infrastructure (Landscape character is defined by the transition zone into the open, wilder landscape in the north. Ancillary uses will have a visually recessive colour as far as reasonably practicable. Darker colours will be used to ground the buildings and these should be developed in accordance with the colour strategy).
- Colour strategy - Environmental Colour Assessment (ECA) must be undertaken in consideration of the whole Site in accordance with Landscape Institute Guidance Note: Environmental Colour Assessment 04/18. This assessment will develop a palette of colours to integrate the Proposed Development into its local context, and ensure that built form and hard landscape appears recessive in more distant views. For example, white/very pale colours should not be used on upper building levels/rooftops as it is likely to appear in contrast with adjacent landscape from elevated viewpoints. The ECA should also develop a strategy informed by the baseline findings of the colour assessment which identifies and provides;
 - Accent colours. A sharper accent colour may be used to articulate the form of building(s), break up the massing of a large building, assist with placemaking and positively contribute to local identity.
 - Consistency within the different areas of the Proposed Development, and particularly along the same street. There should be some consistency in the palette of colours and how they are applied to buildings (i.e. the position) along the same street to create a harmonious character. It will also be important to consider how the different areas work collectively within the strategy.

The ECA is secured within the Compliance Form.

- Lighting strategy (set out in the Lighting Assessment in **Appendix 14.5** under mitigation)
- Monitoring of the effectiveness of the mitigation - primarily the landscape strategy, which would be monitored and remedied if required (replacement planting), this would take place within the 5 years following completion of the works.

14.8 Assessment of Likely Effects

Effects associated with Demolition/Construction

- 14.8.1 This section of the assessment addresses the impact associated with the demolition/construction phase of the Proposed Development. The principle of demolition and construction on much of the Site has already been agreed in the 2017 Planning Consent, with the exception of the 37 Club which would be demolished as part of the LDO. The demolition of the 37 Club would be a relatively small scale undertaking and landscape and visual effects arising from this element would be minimal.

- 14.8.2 The implementation of the LDO will be market-led and therefore a construction programme is not available at this time. Construction is assumed to take place as one continuous phase, and it is not possible to establish how areas might become occupied whilst the remainder of the Proposed Development is being built out. However, it is reasonable to assume that visual receptors on the Site (people living on the Site or using it for work or recreation) could experience some notable adverse visual effects due to the construction works. The precise nature of these, however, cannot be established at this stage given the way the likely is likely to be built out, however, as noted in section 14.7 measures to minimise adverse effects on those visual receptors have been incorporated into the **Design Guide**. It is likely that the construction stage would be long term, however, effects would be temporary and changing throughout the construction period. During this timeframe, the potential landscape and visual impacts arising from the construction process would vary in significance, however, the construction period effects will be assessed based on the 'worst case scenario', that is the point at which it is considered the effects on individual receptors would be at their greatest. As time progresses, the landscape and visual effects from the construction activities would begin to be concentrated in smaller areas, while the designed appearance of the completed development, plus associated mitigation planting, would become more prominent. In addition, construction activities associated with the later stages of development could, from certain receptors, be screened by those earlier phases already completed.
- 14.8.3 Given the nature of the Proposed Development, it is understood that there would be large plant, such as cranes, on Site during the demolition/construction phase.
- 14.8.4 Construction impacts are, by their nature, temporary. The duration of an impact may be considered to be a material consideration, for example a higher impact may be deemed more acceptable if it only endures for a short period of time. In this case, construction effects are considered to be long term since a construction programme is not available.
- 14.8.5 Direct effects are those which result directly from the Proposed Development itself. No indirect landscape and visual effects have been identified as part of this assessment.
- 14.8.6 During the construction period, effects are likely to be temporary and are generally adverse in nature for the limited period of the works. Given the nature of the Proposed Development, it is anticipated that construction effects could be long term albeit temporary, the following effects may be experienced;
- Demolition of buildings within the 37 Club;
 - Removal of existing landscape features (including vegetation, fields, rhynes, etc.);
 - Views of machinery and equipment including tall cranes and workforce accommodation;
 - Noise (influencing landscape character) and views of construction equipment moving on Site;
 - Views of materials storage areas/earthworks;
 - Views of construction traffic entering and leaving the Site;
 - Views of construction lighting (mobile units and flashing lights from construction vehicles);
 - Temporary albeit potentially long term disruption to permissive pathways (but not PRow); and
 - Changes to the immediate local landscape character.

- 14.8.7 The **FDCEMP** includes embedded mitigation measures such as tree protection, and ecological protections along with lighting, working hours, noise and traffic movements during demolition and construction.
- 14.8.8 In terms of landscape and visual impact, the construction stage of the Proposed Development would potentially impact on the landscape elements set out below.
- 14.8.9 Vegetation work would include:
- Hedgerows and trees would be removed within the Site to facilitate the Proposed Development as recorded in the **AIA**, **Appendix 14.4**.
 - Existing trees and hedgerows which are proposed for retention as part of the final scheme would be vulnerable to the construction processes. This vegetation would be protected in accordance with the requirements included in the **AIA** in **Appendix 14.4** and the **FDCEMP** in **Appendix 4.1**.
- 14.8.10 Landform/Topsoil work would include:
- Topsoil 'strip' of agricultural fields and storage of topsoil for reuse as required;
 - Excavation for foundations for new buildings, roads, parking areas and the laying of underground services, including areas of 'cut and fill' as required; and
 - Cut and fill as required to form the drainage strategy.
- 14.8.11 There would be no disruption to PRoW to facilitate the construction works, however, there may be some temporary disruption to two permissive paths linking to Puriton and Woolavington during the construction stage, and the permissive pathways associated with the approved village enhancement scheme.

Landscape Effects during Construction

- 14.8.12 The predicted impacts and effects are assessed based on the 'worst case scenario'. The point during the phasing programme which is considered to give rise to the highest landscape and visual effects experienced by each receptor is described in the assessment which follows.
- 14.8.13 Refer to **Appendix 14.3 Landscape and Visual Impact Assessment Tables** for a summary of the landscape and visual effects discussed in the following paragraphs.

Sedgemoor Landscape Assessment – Character Area – Moors and Levels (Medium Sensitivity)

As previously described this CA covers a vast area and includes the built form of the 2017 Planning Consent. The CA would receive a physical impact in the small area covered by the Site. Much of the Site has been in industrial use for some seventy years; albeit, the scale and massing of the construction works would be greater than that of the former ROF, and the built form of the 2017 Planning Consent which would occupy the Site in 2032. However, although the Proposed Development is of a very large scale, there are other large scale buildings within, and visible from the low lying landscape in this area and, on balance, it is therefore considered that the magnitude of effect would be 'Medium' resulting in a temporary **'Moderate Adverse Effect'**.

Sedgemoor Landscape Assessment – Character Area – Lowland Hills - Polden Hills (High Sensitivity)

- 14.8.14 The Polden Hills as described in the SLA covers the whole of this ridgeline, running from adjacent to Junction 23 of the M5 in the west to the east of the village of Ashcott some 13 km to the east. In 2032 views of the 2017 Planning Consent buildings would influence character, however, construction works on the Site would introduce large scale construction equipment, noise and movement. This would result in a relatively small area of physical change, as only the Gravity Link Road and southernmost part of the Site lies within this CA, other effects would be limited to those of setting due to intervisibility with the Site from the hills. As a consequence it is considered that the overall magnitude of effect would be 'Low' resulting in a temporary **'Moderate Adverse Effect'**.

Sedgemoor Landscape Assessment – Character Area – Lowland Hills – Wider Area (High Sensitivity)

- 14.8.15 A number of small hills and knolls rise from the low lying landscape, including Pawlett Hill and Brent Knoll and while these have an inter-visibility with the Site; effects would be limited to setting. It is unlikely that any glimpses towards the 2017 Planning Consent buildings would be available in 2032. Given their distance and setting within this large landscape, it is considered that the magnitude of effect to landscape character during the construction stage is 'Very Low' resulting in a temporary **'Minor Adverse Effect'**.

Mendips AONB (Very High Sensitivity)

- 14.8.16 The Mendips AONB sits some 15 km to the north of the Site and its ridgeline forms the visual envelope to the north of the low lying Somerset landscape. This ridgeline is visible from the Site and in several views forms the skyline, however, it is unlikely that the limited views available of the 2017 Planning Consent buildings would influence character within the AONB in 2032 due to the distance involved. Effects on the AONB would be limited to the influence of views from the ridge towards the distant Proposed Development. Given the distance between the Site and the AONB, and the existing context of views towards the low lying landscape, it is considered that the magnitude of effect that construction of the Proposed Development would cause to its landscape character is 'Very Low' resulting in a temporary **'Negligible Adverse Effect'**. The Mendips AONB officer was not concerned about the Proposed Development during consultation as noted in section **14.4.2**.

Quantocks AONB (Very High Sensitivity)

- 14.8.17 The Quantocks AONB lies approximately 17 km to the south west of the Site and its ridgeline forms the distant visual envelope to the south west of Bridgwater, however, it is unlikely that the limited views available of the 2017 Planning Consent buildings would influence character within the AONB in 2032 due to the distance involved. Effects on the AONB would be limited to the influence of views from the ridge towards the distant Proposed Development. Given the distance between the Site and the AONB, and the existing context of views towards the low lying landscape, it is considered that the magnitude of effect the construction of the Proposed Development would cause to its landscape character is 'is 'Very Low' resulting in a temporary **'Negligible Adverse Effect'**. The Quantocks AONB officer was not concerned about the Proposed Development during consultation as noted in section **14.4.2**.

CA1 – Former ROF Site (Low Sensitivity)

- 14.8.18 This character area would be physically affected by the construction phase as it lies within the Site. Much of the Site has been in industrial use for the last seventy years and in 2032 parts would be occupied by large scale industrial buildings within the 2017 Planning Consent. During construction, vegetation within the Proposed Development areas would be removed, including some young structure planting associated with the 2017 Planning Consent, resulting in the loss of trees and hedgerows within much of this area. The remaining ditch system would be cleared within the development areas with the exception of key drainage channels. Topsoil would be stripped where available and stored. The large scale clearance, views of construction equipment, noise and movement on the Site is

considered to constitute a 'Very High' magnitude of effect resulting in a temporary
'Substantial Adverse Effect'.

CA2 – Levels and Moors north of Woolavington (Medium Sensitivity)

- 14.8.19 This character area would be physically affected due to an area of construction works on the eastern part of the Site (this area was not included in the 2017 Planning Consent – refer to **Appendix 1.2** for comparative Site boundaries), including loss of vegetation and ditches. In addition, there is intervisibility between this CA and the rest of the Site (including the built form of the 2017 Planning Consent), on which the construction works would be openly visible and would be likely to influence character. The clearance and construction works, including views of equipment, noise and movement across the Site would result in some reduction in tranquillity and a 'High' magnitude of effect and a temporary **'Substantial Adverse Effect'**.

CA3 – Levels and Moors adjacent to the M5 (Low Sensitivity)

- 14.8.20 This character area would have some intervisibility with the 2017 Planning Consent buildings in 2032, however, as a result of the Proposed Development it would undergo direct physical change within the railway corridor and the westernmost parts of the Site, including works associated with the railway link. There would be some loss of vegetation in this area, the precise details of which are not available at this time, and the influence of views towards the works within the main Proposed Development area which would comprise clearance, large scale equipment, noise and movement during construction would constitute a magnitude of effect of 'Medium' and a temporary **'Moderate Adverse Effect'**.

CA4 – Land to the south of the former ROF (Medium Sensitivity)

- 14.8.21 This character area would have some intervisibility with the 2017 Planning Consent buildings in 2032, however, as a result of the Proposed Development the majority of this character area would be physically affected by the construction works extending to the north of Woolavington Road between the villages, requiring considerable loss of vegetation and clearance and construction works. Combined with the influence of views of clearance, large scale equipment, noise and movement across the wider construction site, it is considered that the magnitude of effect would be 'Very High'. This would result in a temporary **'Substantial Adverse Effect'**.

CA5 – Puriton (Medium Sensitivity)

- 14.8.22 This character area would have some intervisibility with the 2017 Planning Consent buildings in 2032. The only physical change as a result of the Proposed Development within this character area would be the increased construction traffic accessing the Site. However, there would be effects on its setting due to views across the proposed construction works, and associated noise and movement. Overall, it is considered that the magnitude of effect on the character of the village would be 'Medium' resulting in a temporary **'Moderate Adverse Effect'**.

CA6 – Woolavington (Medium Sensitivity)

- 14.8.23 This character area would have some intervisibility with the 2017 Planning Consent buildings in 2032. The village of Woolavington would not receive physical change due to the construction works. However, the south eastern corner of the Site boundary does extend to the village edge, and the western and northern edge of the village has an inter-visibility with the Site so that indirect effects on setting due to views of clearance, large scale equipment, storage areas, noise and movement from the works would result. The overall magnitude of effect on the character of the village would be 'Medium', resulting in a temporary **'Moderate Adverse Effect'**.

CA7 – The Polden Hills (High Sensitivity)

- 14.8.24 This local character area covers a short stretch of the Polden Hills' northern face between Puriton and Woolavington. This character area would have some intervisibility with the 2017 Planning Consent buildings in 2032. This CA would receive no physical change but impacts

as a result of construction works clearance, large scale equipment, noise and movement on the Site seen on lower lying land below, and reduction in tranquillity would influence its setting. The construction stage would result in a 'High' magnitude of effect resulting in a temporary '**Substantial Adverse Effect**'.

Visual Effects during Construction

- 14.8.25 Effects on the views of visual receptors during construction would be adverse and temporary in nature, albeit long term, and are considered below as follows:

Viewpoint A – View looking south east from the M5 adjacent to the Huntspill River. (1200 m from main Site boundary) Photomontage Viewpoint (Motorists Medium Sensitivity)

- 14.8.26 For motorists passing at speed along this stretch of the motorway, the existing 2017 Planning Consent buildings would be partially visible. The vegetation clearance required in the north west corner of the Site for the rail yards (the extent of which is uncertain at this time but a worst case is assumed of clearance of the whole woodland area within the rail corridor and potential replacement of the rail bridge over the M5) and the introduction of the large scale construction equipment and emerging large scale built form of the Proposed Development which would occupy parts of the skyline in places and be perceived as a prominent feature in the landscape, would be a considerable change. In 2032, lower level built form would be visible on the Site, and previously the industrial features of the former ROF were prominent in views from this location. Despite the existing context of the views, including the dominant pylon runs, the clearance and introduction of large scale construction equipment and some very large scale built form on the Site as works progress would constitute a 'High' magnitude of effect resulting in a temporary '**Substantial Adverse Effect**'.

Viewpoint B – View looking east towards the Site from Batch Road (500 m from the Site boundary) (Motorists - Low Sensitivity, Pedestrians - Medium Sensitivity)

- 14.8.27 For motorists and pedestrians on the lane, built form within the 2017 Planning Consent would be visible, albeit it would be partially screened by existing vegetation, just as the previous industrial buildings on the former ROF in the centre of the Site were also visible on the skyline historically. Within the Proposed Development, there would be vegetation clearance required in the north west corner of the Site for the rail yards (the extent of which is uncertain at this time but a worst case is assumed of clearance of the whole woodland area within the rail corridor) and large scale construction equipment and emerging buildings would form parts of the skyline from this location, although, in some places the intervening trees would break up the elevation to a degree. As such the magnitude of effect would be 'High' resulting in a temporary '**Moderate Adverse Effect**' for pedestrians, and motorists.

Viewpoint C – View looking north towards the Site from the Woolavington Road (within the Site) (Motorists - Medium Sensitivity)

- 14.8.28 The relatively recent introduction of the Gravity Link Road and the built form of the 2017 Planning Consent would be fairly openly visible from this location, although starting to be slightly filtered by maturing vegetation. The construction phase would introduce extensive views of large scale construction equipment, clearance works, including the clearance of trees and vegetation across a large proportion of the Site, and storage areas, along with additional construction traffic accessing the Site. As the construction progresses, large scale built form would emerge, occupying much of the skyline, which would be openly visible across much of the view. The overall magnitude of effect is considered to be 'Very High' resulting in a temporary '**Substantial Adverse Effect**'.

Viewpoint D – View looking north-east across the Site the Site from the Woolavington Road (adjacent to the Site boundary) (Motorists Medium Sensitivity)

- 14.8.29 From this location, historically, views of chimneys and built form were visible on the former ROF, however, these have now been demolished, leaving views towards the T-pylon run, and the edge of the buildings of the 2017 Planning Consent, with the village edge and rural landscape beyond. The introduction of the large scale equipment, clearance (including loss of trees and hedgerows), and storage areas within the construction phase, and the emerging large scale built form as works progress would be openly visible to passing motorists from this location. However, the land beneath the T-pylons would remain open so that in later stages of construction this area would appear as open space. Overall this would constitute a 'Very High' magnitude of effect resulting in a temporary **'Substantial Adverse Effect'**.

Viewpoint E – View looking south west from the car park adjacent to The Causeway immediately to the south of the Huntspill River (800 m from Site boundary) Photomontage Viewpoint (Walkers – High Sensitivity, anglers and Motorists - Medium Sensitivity)

- 14.8.30 Historically, the buildings on the former ROF formed an incongruous element in this landscape, and subsequent views towards the built form of the 2017 Planning Consent would have occupied the central part of the view, although not breaking the skyline, and views would have been filtered by maturing structure planting, and some intervening existing vegetation. The T-pylons run would also be openly visible from this location. The large scale construction equipment, clearance works (including removal of trees and hedgerows on the northern part of the Site) and storage areas would be partially visible, and the emerging large scale commercial unit(s) would occupy a considerable part of the skyline as construction works progress. This would constitute a 'High' magnitude of effect resulting in a temporary **'Substantial Adverse Effect'**.

Viewpoint F (previously VR17) – View looking west from the Causeway towards the Site (415 m from main Site) (Motorists Medium Sensitivity)

- 14.8.31 Historically, the buildings on the former ROF formed an incongruous element in this landscape, and subsequent views towards the built form of the 2017 Planning Consent would have occupied the central part of the view, views would have been filtered by maturing structure planting, and some intervening existing vegetation. The T-pylons run would also be openly visible from this location. During the construction stage, large scale construction equipment, clearance works (including removal of trees and hedgerows on the northern and eastern parts of the Site) and storage would be visible to motorists along this stretch of the Causeway initially, with large scale built form emerging as construction progresses, breaking the skyline, and forming a dominant feature in views along the road. This would constitute a 'High' magnitude of effect resulting in a temporary **'Substantial Adverse Effect'**.

Viewpoint G – View looking south from Withy Road approaching East Huntspill (1.9 km to the main Site) Photomontage Viewpoint (Residents High Sensitivity, Motorists Medium Sensitivity)

- 14.8.32 This view is intended to be representative of the views available to local residents within and around East Huntspill. This flat, rural landscape is more well vegetated than the land further south, and due to the flat nature of the land much of the wider landscape is obscured from view by intervening mature hedgerows and trees, resulting in a rural character to the view. In 2032, the 2017 Planning Consent buildings would be unlikely to be visible, due to intervening vegetation. During the early phases of the construction stage it is unlikely there would be any views of the construction works, although it is possible that glimpses of the upper parts of cranes would be available to the skyline. As construction progresses within the Site, the upper parts of the large, commercial unit(s) and stacks would become just visible beyond intervening skyline vegetation, particularly during winter months when the trees are out of leaf. However, due to intervening vegetation they would not appear as a dominant feature in this view. Despite the numerous electricity pylons, this view appears

predominantly rural and the introduction of the large scale built form of the Proposed Development on the skyline, albeit much is obscured by vegetation, would result in a 'Medium' magnitude of effect and therefore, a temporary '**Moderate Adverse Effect**'.

Viewpoint H (previously VR18) – View looking north from the footpath BW28/2 to the east of Puriton (500 m from main Site boundary and 250 m from roundabout on Woolavington Road) (Walkers and residents on the edge of Puriton Medium Sensitivity)

- 14.8.33 From this location at present there are views across lower lying land to the north, including the Site, with lighting columns along the Gravity Link Road corridor to the east, and by 2032 it is assumed that the residential development proposed for the foreground of this view would be complete, therefore predominantly obscuring the 2017 Planning Consent buildings which would otherwise be visible. From the footpath, some channelled glimpses of construction works across the Site would be likely to be available in places, and also for some residents on the northern edge of the new residential development some partial views across large construction equipment, clearance and storage areas, and as works progress, emerging large scale built form and stacks within the Proposed Development could be available, depending on the final design layout for the residential development. This would constitute a 'Medium' magnitude of effect resulting in a temporary '**Moderate Adverse Effect**'.

Viewpoint I (previously VR19) – View looking north from Bridleway BW28/1 adjacent to Home Covert - Photomontage Viewpoint (750 m from main Site boundary, 250 m from Gravity Link Road) (Walkers/horse riders High Sensitivity)

- 14.8.34 From this elevated viewpoint along the ridge it is possible for walkers to see a large proportion of the Site. Historically built form has been present (the former ROF), just as in 2032 the buildings of the 2017 Planning Consent would be openly visible. The large scale construction works including equipment, clearance, and storage areas would be openly visible in the middle distance of this view, and as construction progresses the large scale built form of the Proposed Development would emerge, although the works would largely sit below the skyline. These changes are considered to cause a 'Very High' magnitude of effect and a temporary '**Substantial Adverse Effect**'.

Viewpoint J (previously VR20) – View looking north from Hillside as it enters Puriton from the south (750 m from main Site boundary 75 m from Gravity Link Road) (Motorists and walkers Medium Sensitivity)

- 14.8.35 The bund associated with the Gravity Link Road corridor screens many of the existing houses on the southern edge of the village, and by 2032 as vegetation on the bund matures, views towards the lower lying land to the north (and the Site within it) would be considerably reduced. In winter months, there may be small glimpses of parts of the large scale buildings of the 2017 Planning Consent in the middle distance. Although trees on the bund would form much of the skyline. During the construction stage, large scale construction equipment may be glimpsed on the skyline, and as construction progresses, large scale built form and stacks may be partially visible, particularly during winter months. This change would result in a 'Low' magnitude of effect and therefore a temporary '**Moderate Adverse Effect**'.

Viewpoint K (previously VR21) – View looking north west from Crancombe Lane as it passes/enters Woolavington (440 m from Site boundary) Photomontage Viewpoint (Motorists, Walkers and Residents Medium Sensitivity)

- 14.8.36 From this edge of the village, the Site is visible in the middle distance, and in 2032 large scale built form would be openly visible, although lower levels of buildings would be softened by maturing vegetation, and built form would not break the skyline. In addition, the new residential development on the edge of the village would be completed, extending the village towards the Site. Due to the slightly elevated nature of the lane, walkers and residents would have views across much of the Site, and during construction, the clearance works, large

scale construction equipment and storage areas would be openly visible resulting in a 'Very High' magnitude of effect and therefore a temporary **'Substantial Adverse Effect'**.

Viewpoint L (previously VR22) – View looking east along the A39 to the south of Puriton (850 m from main Site, 0 m from the Gravity Link Road junction) (Residents and motorists Medium Sensitivity)

- 14.8.37 This view is experienced by drivers travelling along the A39 and the small number of residents living to the south of the A39. In 2032, the roadside vegetation and that planted in the centre of the roundabout would have matured to reduce views northwards towards the main Site, and the 2017 Planning Consent buildings would not be visible to motorists, since the road bund and associated planting would obscure much of the view northwards, however, it is likely that residents would have views towards them from upper storeys. Similarly, it is not anticipated that the construction works within the Proposed Development would be visible from this location from ground level, due to the bund and maturing vegetation. However, the construction traffic to and from the Site would be perceptible during working hours and residents would be likely to have some views from north facing windows in upper storeys towards large scale construction equipment, and clearance on the Site, and the emerging buildings and stacks as works progress. Due to the limited availability of these views, this would result in a 'Low' magnitude of effect, and therefore a temporary **'Minor Adverse Effect'** for residents and motorists.

Viewpoint M (previously VR24) – View looking east from Pawlett (2.4 km from the main Site) (Residents and motorists Medium Sensitivity)

- 14.8.38 From this viewpoint, motorists and a small number of residents are able to discern the block of woodland in the Site's north western corner. In 2032, the 2017 Planning Consent would be barely visible, and the buildings would be largely screened by intervening vegetation. During the construction stage, there would be some loss of the block of woodland, although the precise extent of this is unknown at this stage, and large scale construction equipment would be partially visible on the Site, and as construction progresses, large scale built form, and the tops of stacks would begin to be visible on the skyline, although much of the lower parts of the buildings would be largely screened by intervening vegetation. This would be considered a 'Low' magnitude of effect, resulting in a temporary **'Moderate Adverse Effect'**.

Viewpoint N (previously VR25) – View looking east from Steart Drove BW25/3 Long distance trail (5.7 km from the main Site) (High Sensitivity)

- 14.8.39 Views from this area are very expansive and walkers can just discern the block of woodland in the Site's north western corner as part of a wide panorama but no detail with the naked eye from this location. In 2032, the 2017 Planning Consent would be unlikely to be visible, with the buildings largely screened by intervening vegetation. During construction of the Proposed Development, there may be glimpses of large scale construction equipment on the skyline, and due to clearance the block of woodland may appear reduced, depending on the extent of clearance required for the rail yard. The Proposed Development's large scale built form, would become visible on the skyline as construction works progress, along with the stacks, although these changes would be very distant. This would be considered a 'Very Low' magnitude of effect, resulting in a temporary **'Minor Adverse Effect'**.

Viewpoint O (previously VR26) – View looking north east from the Quantock Hills (17 km from the Site) (Very High Sensitivity)

- 14.8.40 Given the distance between this location and the Site, and the difficulty in identifying the features of the Site, in 2032 it is considered unlikely that the buildings within the 2017 Planning Consent would be perceptible. During construction of the Proposed Development, depending on the weather conditions/visibility, on a clear day, it would just be possible for walkers to discern some construction works on the Site, and as the works progress, the larger elements of the Proposed Development. Although these changes would be set within the context of the low lying Somerset landscape which includes numerous examples of large

scale built form. This would result in a 'Very Low' magnitude of effect and therefore a temporary '**Minor Adverse Effect**'. The Quantocks AONB officer was not concerned about the Proposed Development during consultation as noted in section **14.4.2**.

Viewpoint P (previously VR27) – View looking north from the bridge above the M5 (5 km from the Site) (Low Sensitivity)

- 14.8.41 For motorists, residents and walkers south of the Polden Ridge, there would not be any views of the 2017 Planning Consent as it would be screened by the ridge itself. The construction works would not be visible, and as works progress neither the buildings nor the stacks of the Proposed Development would be visible from this location, resulting in a magnitude of effect of 'None', and therefore '**No Change**'.

Viewpoint Q (previously VR29) – View looking south from the Mendip Hills (15 km from the Site) (Very High Sensitivity)

- 14.8.42 Given the distance between this location and the Site, and the difficulty in discerning the existing features on it, it would be unlikely that the 2017 Planning Consent would be visible. During construction within the Proposed Development much of the detail would not be perceptible from these hillsides, however, on clear days the construction works would be likely to be just visible, and as construction progresses the large commercial unit(s) and stacks would be likely to be distantly visible. As a result of the existing context of views towards the low lying Somerset landscape, which includes some existing large scale built form, and the distance involved, there would be a 'Very Low' magnitude of effect and therefore a temporary '**Minor Adverse Effect**'. The Mendips AONB officer was not concerned about the Proposed Development during consultation as noted in section **14.4.2**.

Viewpoint R (previously VR30) – View looking south east from the Brent Knoll (8.5 km from the Site) (Very High Sensitivity)

- 14.8.43 Although this location is not as distant as the Mendip Hills, it is still a considerable distance from the Site, and given the distance, and the difficulty in discerning the existing features on the Site, it would be unlikely that the 2017 Planning Consent would be visible. During the construction stage, within the Proposed Development on clear days glimpses of cranes on the Site would potentially be available and as construction progresses, the large commercial unit(s) and stacks would be likely to be distantly visible, set within the context of the M5 motorway and large scale built form along its corridor. As a result of the existing context of views towards the low lying Somerset landscape, and the distance involved, there would be a 'Low' magnitude of effect and therefore a temporary '**Moderate Adverse Effect**'.

Landscape Effects associated with Operation

- 14.8.44 This section of the assessment addresses the impacts associated with the operation stage of the Proposed Development. Direct effects are those which result directly from the Proposed Development itself. No indirect landscape and visual effects have been identified as part of this assessment.
- 14.8.45 As previously noted in paragraph **14.6.27**, the assessment is based on an assumed 2032 baseline. It is usual practice to assess landscape and visual effects at Year 1 and Year 15, to allow for the maturing of newly planted vegetation (assumed to be 8-11.5m growth in this case), and enable the Proposed Development to achieve its design aspirations. Therefore, these terms remain through the assessment sections, however, it is accepted that this is a simplification of the reality.
- 14.8.46 Refer to **Appendix 14.3 Landscape and Visual Impact Assessment Tables** for a summary of the landscape effects discussed in the following paragraphs, including whether effects are considered significant in EIA terms.

Sedgemoor Landscape Assessment – Character Area – Levels and Moors (Medium Sensitivity)

- 14.8.47 As previously described this CA covers a vast area and includes the 2017 Planning Consent within it. The CA would receive a physical change in the small area covered by the Site. Much of the Site has been in industrial use for some seventy years; although, the scale and massing of the Proposed Development would be much greater than that of the 2017 Planning Consent built form which would be present on the Site in 2032. There are some large scale buildings already present on the Levels, albeit the Proposed Development would be of a very large scale and notably taller those existing, however, on balance, given the proportion of this broad landscape character area affected, it is considered that the magnitude of effect at Year 1 would be 'Medium' resulting in a **'Moderate Adverse Effect'**. This would remain the same at Year 15.

Sedgemoor Landscape Assessment – Character Area – Lowland Hills - Polden Hills (High Sensitivity)

- 14.8.48 The Polden Hills as described in the SLA covers the whole of this ridgeline, running from adjacent to Junction 23 of the M5 in the west to the east of the village of Ashcott some 13 km to the east, and in 2032 the 2017 Planning Consent would be visible from the north face of the ridge between Puriton and Woolavington. A small part of this large character area would receive a small, beneficial physical change in the form of the further maturation of planting associated with the Gravity Link Road corridor. However, impacts due to the Proposed Development on the main Site would be limited to physical change on the southernmost part of the Site which would include new buildings between 9 and 15 m high and green infrastructure, and otherwise limited to those of setting due to intervisibility with the Site from the hills, which is limited to the north face of the ridge. As a consequence it is considered that the overall magnitude of effect at Year 1 would be 'Low' resulting in a **'Moderate Adverse Effect'**. This would remain the same at Year 15.

Sedgemoor Landscape Assessment – Character Area – Lowland Hills – Wider Area (High Sensitivity)

- 14.8.49 A number of small hills and knolls rise from the low lying landscape, including Pawlett Hill and Brent Knoll and these have an intervisibility with the Site. Given their distance and setting within this large landscape, it is considered that the magnitude of effect on landscape character resulting from this intervisibility with the Proposed Development is 'Very Low' resulting in a **'Minor Adverse Effect'**. This would remain the same at Year 15.

Mendips AONB – (Very High Sensitivity)

The Mendips AONB sits some 15 km to the north of the Site and its ridgeline forms the visual envelope to the north of the low lying Somerset landscape. This ridgeline is visible from the Site and in several views forms the skyline. The Mendips AONB would not be physically affected by the Proposed Development, however, there is an intervisibility with the Site, although given the distance between the Site and the AONB, and the existing context of views towards the low lying landscape, it is considered that the magnitude of effect the Proposed Development would cause to its landscape character is 'Very Low' resulting in a **'Negligible Adverse Effect'** at Year 1 and 15. The Mendips AONB officer was not concerned about the Proposed Development during consultation as noted in section **14.4.2**.

Quantocks AONB – (Very High Sensitivity)

- 14.8.50 The Quantocks AONB sits some 12 km to the south west of the Site and its ridgeline forms the visual envelope to the south west of Bridgwater. The Quantocks AONB would not be physically affected by the Proposed Development and therefore effects would be limited to the influence of views on setting. Given the distance between the Site and the AONB, and the existing context of views towards the low lying landscape, it is considered that the magnitude of effect the Proposed Development would cause to its landscape character is 'is

'Very Low' resulting in a '**Negligible Adverse Effect**' at Year 1 and 15. The Quantocks AONB officer was not concerned about the Proposed Development during consultation as noted in section 14.4.2.

CA1 – Former ROF Site (Low Sensitivity)

- 14.8.51 All of this CA lies within the Site and would be physically affected by the Proposed Development. Much of the CA has been in industrial use for the last seventy years and in 2032 parts would be occupied by large scale buildings within the 2017 Planning Consent.
- 14.8.52 The taller parts of the Proposed Development would be concentrated within the central part of the Site, stepping down towards the Woolavington Road. Much of the vegetation around the Site's periphery would be retained, as would elements of the ditch system wherever possible, although there would have been clearance for the larger building footprints during construction. The removal of numerous trees and hedgerows would have been undertaken during construction to facilitate such a large scale re-development, along with some young structure planting associated with the 2017 Planning Consent, and within this area very little vegetation would be retained. However, the Proposed Development would bring forward a considerable amount of new planting.
- 14.8.53 Lighting previously existed on the former ROF, and within the 2017 Planning Consent, however, compared to the 2017 Planning Consent, the increased area of development would extend across this CA and beyond and the majority of the Site would be lit.
- 14.8.54 The replacement of the 2017 Planning Consent buildings with the very large scale built form proposed would increase the scale of man-made elements, influencing character, and would result in 'the addition of new and uncharacteristic conspicuous features and elements' as set out in the methodology, and as a consequence is considered to constitute a 'Very High' magnitude of effect resulting in a '**Substantial Adverse Effect**' at Year 1. This would remain the case at Year 15.

CA2 – Moors and Levels north of Woolavington (Medium Sensitivity)

- 14.8.55 This character area would be physically affected by an area of new large scale built form on the eastern part of the Site, and the introduction of the footpath links to Woolavington. There would have been a loss of vegetation along the eastern edge of the Site, and some of the ditch system in this area during construction. In addition, there is an intervisibility between this CA and the rest of the Site, on which the buildings of the 2017 Planning Consent would have been visible, along with maturing structure planting (much of which would be removed).
- 14.8.56 Character is influenced by views of lighting within the 2017 Planning Consent (lighting also previously existed on the former ROF), however, compared to the 2017 Planning Consent, a considerably increased area of development would be lit.
- 14.8.57 The replacement of the 2017 Planning Consent buildings with the very large scale built form proposed would increase the scale of man-made elements in views from the CA, influencing its character and as such is considered to be 'the addition of new but uncharacteristic noticeable features and elements' as set out in the methodology, constituting a 'Medium' magnitude of effect and a '**Moderate Adverse Effect**' at Year 1. This would remain the case at Year 15.

CA3 – Moors and Levels adjacent to the M5 (Low Sensitivity)

- 14.8.58 This character area would be physically affected within the railway corridor and the westernmost parts of the Site, due to the rail corridor and associated infrastructure and an area to the south of the western boundary which may include built form (up to 11 m ridge height), however, other areas within the Site are proposed for greenspace and include structural tree and woodland planting.

- 14.8.59 This CA has various light sources, including the motorway, and character is influenced by views of lighting within the 2017 Planning Consent (lighting also previously existed on the former ROF), however, compared to the 2017 Planning Consent, a considerably increased area of development would be lit.
- 14.8.60 There would be direct impacts as a result of a loss of existing vegetation within the rail corridor and building footprints during construction, however, the precise extent of this is uncertain at present. In relation to the influence on character of views towards the Site, there is already a large number of man-made, Twentieth Century influences evident in this area in the form of the motorway, railway, solar park, 2017 Planning Consent buildings, the landfill site and numerous pylons, and the influence of views towards the Proposed Development and the physical changes to the CA would constitute 'the addition of new but uncharacteristic perceptible features and elements' as set out in the methodology, and therefore a magnitude of effect of 'Low' and a **'Minor Adverse Effect'** at both Year 1 and 15 to the landscape character of this area.

CA4 – Land to the south of the former ROF (Medium Sensitivity)

- 14.8.61 The scale and massing of the Proposed Development would be greater than that of the 2017 Planning Consent built form which would be present on the Site in 2032. In addition, there would be direct impacts on this CA and the majority of this character area would be physically affected as it lies within the Site, with built form proposed across most of the CA between the villages, and a considerable loss of vegetation during construction. In consideration of the setting, built form in this area is proposed to be lower than the large commercial unit(s) and the design 'steps up' in height from the Woolavington Road. To retain the more intimate feel of this character area, proposed development areas are smaller with some residential included, and it would be well vegetated, providing a green edge to the Woolavington Road, and allowing breaks between built form to provide open space and vegetation between the villages within the Arrival and Wellbeing Area and Gravity Park.
- 14.8.62 Lighting previously existed on the former ROF, and within the 2017 Planning Consent, however, compared to the 2017 Planning Consent, the increased area of development would extend across this CA and the area would be lit.
- 14.8.63 Due to its proximity to the large commercial unit(s), this CA would also receive some impacts due to the influence of views of the proposed very large scale built form on the central part of the Site.
- 14.8.64 In addition to the influence of views, and physical change within the CA, a corresponding decrease in the level of tranquillity would be anticipated. As a consequence it is considered that the magnitude of effect would be 'Very High', defined in the methodology as 'notable change in landscape characteristics over a wide area or an intensive change over a more limited area'. This would result in a **'Substantial Adverse Effect'** at Year 1. Over time, the structure planting and green space within the Proposed Development would help to soften and assimilate it into the wider landscape, however, an 'intensive change' would remain and, therefore, the effect would remain the same at Year 15.

CA5 – Puriton (Medium Sensitivity)

- 14.8.65 There would be direct impacts on the setting of this character area resulting from the scale and massing of the Proposed Development which would be greater than that of the 2017 Planning Consent built form present on the Site in 2032, and in addition, a slight decrease in tranquillity due to increased traffic accessing the Site.
- 14.8.66 The built form proposed in the south western corner of the Site, close to Puriton, would have a maximum height of 11m ridge height, and only 50 percent of the zone would accommodate buildings. This built form would be separated physically and visually by existing, intervening vegetation and as such would have little effect on the character of the village. For details of

effects on Manor Farmhouse Grade II Listed building refer to the **Cultural Heritage Chapter 16** which records a minor adverse residual effect for this historic asset.

- 14.8.67 Lighting previously existed on the former ROF, and within the 2017 Planning Consent, however, compared to the 2017 Planning Consent, in views towards Woolavington Road, the increased area of development would be clearly perceptible from this CA, albeit it would be in the context of the village, and the Gravity Link Road corridor and roundabout which is already lit.
- 14.8.68 Viewed as a whole it is considered that, the overall magnitude of effect on the character of the village would be 'Medium', due to the 'the addition of new but uncharacteristic noticeable features and elements' as set out in the methodology, at Year 1, resulting in a **'Moderate Adverse Effect'**. This effect would remain at Year 15.

CA6 – Woolavington – (Medium Sensitivity)

- 14.8.69 The village of Woolavington would not be physically affected by the Proposed Development, as the south eastern corner of the Site boundary extends only to the village edge. In 2032 the western and northern edge of the village would have an inter-visibility with the large scale built form of the 2017 Planning Consent, and previously had an inter-visibility with the industrial buildings of the former ROF. The new built form across the Proposed Development, particularly the large scale commercial unit(s) and built form towards the eastern boundary would give the wider area a much more developed character resulting in direct impacts on the setting of the village. In addition, smaller scale residential built form is proposed alongside the village edge which would in time extend this CA westwards, albeit the structure planting along the eastern boundary would have matured considerably by Year 15, helping to soften the development and assimilate it into its wider environment from some locations.
- 14.8.70 Lighting previously existed on the former ROF, and within the 2017 Planning Consent, however, compared to the 2017 Planning Consent, in views towards Woolavington Road, the increased area of development would be clearly perceptible from this CA, albeit it would be in the context of the village itself.
- 14.8.71 Viewed as a whole it is considered that, the overall magnitude of effect on the character of the village would be 'Medium', due to the 'the addition of new but uncharacteristic noticeable features and elements' at Year 1 as set out in the methodology, resulting in a **'Moderate Adverse Effect'**. This effect would remain at Year 15.

CA7 – The Polden Hills – (High Sensitivity)

- 14.8.72 This local character area covers a short stretch of the Polden Hills' northern face between Puriton and Woolavington (as outlined in **Figure 14.5, Appendix 14.1**). This CA would receive no physical change but there would be direct impacts as a result of the influence of views towards the Proposed Development on its setting.
- 14.8.73 While in 2032 there is aural intrusion into this CA in the form of the fast moving A39, the M5, and the Gravity Road Link, the wider area is relatively quiet and tranquil. While noise impact has been covered in detail in **Chapter 10**, it should be considered here in as much as the introduction of built form to the north of the Woolavington Road, and to some extent the proposed built form further north within the Site (both in terms of noise and movement) would be likely to decrease the tranquillity for walkers and riders using the footpaths in this area.
- 14.8.74 The Proposed Development would noticeably increase the volume of built form on the flat agricultural landscape to the north compared to the existing 2017 Planning Consent buildings. From elevated views on the Polden Hills this becomes more apparent than from those lower down and perhaps closer. This increase in urban form impacts on the character of this area.

- 14.8.75 This character area would receive an impact from the lighting introduced in association with the Proposed Development, although historically there was some intrusive lighting within the former ROF, and the 2017 Planning Consent would be lit along with the Gravity Link Road corridor which is well lit at night (**Appendix 14.5 Lighting Impact Assessment**).
- 14.8.76 The Gravity Link Road planting within the adjacent CA (Puriton) would be maturing by 2032 and would have a beneficial influence over time as it matures further, filters and screens the road.
- 14.8.77 The Proposed Development is considered to constitute a 'Notable change in landscape characteristics over a wider area or intensive change over a limited area' as set out in the methodology, and therefore a 'High' magnitude of effect at Year 1, resulting in a '**Substantial Adverse Effect**'. While the planting associated with the Proposed Development would continue to mature and soften the built form, this would remain at Year 15.

Visual Effects associated with Operation

- 14.8.78 In order to demonstrate the theoretical visibility of the Proposed Development a ZTV model was run, based on the **Building Heights parameter plan (Appendix 3.1d)**. As illustrated in **Figure 14.8, Appendix 14.1** this shows that the area from which, in theory, the Proposed Development could be seen extends over a wide area to the north, east and west of the Site. However, as previously noted this does not account for vegetation and built form which in reality considerably reduces the area from which the Proposed Development would be visible.
- 14.8.79 As previously noted in paragraph **14.6.27**, the assessment is based on an assumed 2032 baseline. It is usual practice to assess landscape and visual effects at Year 1 and Year 15, to allow for the maturing of newly planted vegetation (assumed to be in the region of 8-11.5m growth in this case), and enable the Proposed Development to achieve its design aspirations. Therefore, these terms would remain through the assessment sections, however, it is accepted that this is a simplification of the reality. All changes to the views of visual receptors are considered to be direct impacts, as they result from the changes associated with the Proposed Development itself.
- 14.8.80 Stack heights of up to 10 m above the height of the main building are normally required in the types of potential development that are considered may come forward at Gravity, however, in some, exceptional circumstances, stacks of up to 25 m could be required. Therefore, it is assumed that 10m stack heights are the most likely but 25 m are also assessed as an exception within the consideration of visual effects.
- 14.8.81 During operation, it is reasonable to assume that visual receptors on the Site (people living on the Site or using it for work or recreation) would experience some notable adverse visual effects due to construction works of later phases of the Proposed Development. The precise nature of these cannot be established at this stage given the way in which the site is likely to be built out, however, as noted in section 14.7 measures to minimise adverse effects on those visual receptors have been incorporated into the **Design Guide**. During this timeframe, the potential visual impacts arising from the construction works would vary in significance. As time progresses, the designed appearance of the completed development, plus associated mitigation planting, would become more prominent. In addition, construction activities associated with the later stages of development could, from certain receptors, be screened by those earlier phases already completed.
- 14.8.82 The photomontages are located on **Figures 14.30-14.49, Appendix 14.1**, and include 2032 baseline images to allow comparison with the Proposed Development, and Year 1 and 15 views. These have been based on the parameter blocks, and strategic landscape included in the parameter plans (**Appendix 3.1f**).

- 14.8.83 Refer to **Appendix 14.3** Visual Impact Assessment Tables for a summary of the visual effects discussed in the following paragraphs, including whether effects are considered significant in EIA terms, in accordance with the methodology.

Viewpoint A – View looking south east from the M5 adjacent to the Huntspill River - Photomontage Viewpoint (1200 m from main Site boundary) (Medium Sensitivity)

- 14.8.84 For motorists passing at speed, the existing 2017 Planning Consent buildings would have been partially visible, albeit they would not have broken the skyline. The introduction of the Proposed Development would result in the much larger commercial building(s) appearing on the skyline, although lower parts would be partially screened by intervening vegetation. This, coupled with the use of the Design Guide colour strategy to clad the buildings, would help to assimilate them within the intervening and surrounding landscape. This is demonstrated in the photomontages, where **Figure 14.30, Appendix 14.1** shows how the baseline would look in 2032. **Figure 14.31 and 14.32, Appendix 14.1** show the new rooflines and stacks which would occupy the skyline and be perceived as a prominent feature in the landscape at Year 1 and 15, illustrating that by this time the structure planting would have matured to screen and filter views towards the lower parts of the development.
- 14.8.85 The existing 2017 Planning Consent would have some lighting within yard areas, as did the former ROF historically, so that lighting is already present in views towards the Site. However, the Proposed Development would introduce some higher level lighting to the proposed rail terminus which would be visible from this location. The lighting assessment found that there would be negligible effects to road users on the M5 due to the Proposed Development (**Appendix 14.5**).
- 14.8.86 In 2032, lower level built form would be visible on the Site, and previously the industrial features of the former ROF were prominent in the views of motorists from this location. Despite the existing context of the views, including the dominant pylon runs, the introduction of very large scale built form on the Site would constitute ‘the addition of new and noticeable uncharacteristic features and elements’ as defined in the methodology, and therefore a ‘High’ magnitude of effect at Year 1 resulting in a **‘Substantial Adverse Effect’**. Due to the height of the proposed buildings, this effect would be likely to remain at Year 15.
- 14.8.87 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint B – View looking east towards the Site from Batch Road (500 m from the Site boundary) (Motorists - Low Sensitivity, Pedestrians - Medium Sensitivity)

- 14.8.88 For motorists and pedestrians on the lane, built form within the 2017 Planning Consent would be visible in 2032, albeit it would be partially screened by existing vegetation, just as the previous industrial buildings on the former ROF in the centre of the Site were also visible on the skyline historically. Within the Proposed Development, the large scale buildings would form parts of the skyline from this location, although, in some places the intervening trees would break up the elevation to a degree. There would be some views of the rail terminus yards, and at night lighting within the rail terminus area would be particularly noticeable, along with lighting elsewhere within the western part of the Site. The lighting assessment does not consider Batch Road but does consider Withy Grove Road which lies slightly further north concerning which it records a *‘moderate adverse effect to residents due to the change in night time views and a negligible effect due to obtrusive light from residual upward light leading to sky glow’*. (**Appendix 14.5**).
- 14.8.89 The Proposed Development is considered to constitute ‘the addition of new and noticeable uncharacteristic features and elements’ as defined in the methodology, and as such the magnitude of effect would be ‘High’ resulting in a **‘Moderate Adverse Effect’** for pedestrians, and motorists at Year 1. This would remain the case at Year 15.

- 14.8.90 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint C – View looking north towards the Site from the Woolavington Road (within the Site) (Motorists - Medium Sensitivity)

- 14.8.91 The relatively recent introduction of the Gravity Link Road corridor and the built form of the 2017 Planning Consent would be fairly openly visible from this location, although starting to be slightly filtered by maturing vegetation. The Proposed Development would introduce considerable additional, large scale built form, occupying much of the skyline, which would be openly visible across much of the view. The design has stepped up development heights in reference to the Woolavington Road and includes a green edge as a buffer along the route. In addition, the Arrival and Wellbeing Area includes considerable green infrastructure which would help to assimilate the changes.
- 14.8.92 The existing Gravity Link Road corridor is lit, as would be the 2017 Planning Consent in 2032. There would be views of lighting across much of the Proposed Development, although the large scale commercial unit(s) would screen views of lighting within the Site to the north to a degree.
- 14.8.93 By Year 15, views of the lower levels of the buildings would be filtered by the existing planting on the roundabout and proposed planting along the Woolavington Road and within the Arrival and Wellbeing Area. However, views of the upper parts of the buildings would remain clearly visible including on the skyline.
- 14.8.94 For motorists, the overall magnitude of effect to this view is considered to be 'Very High' as 'the proposed development would result in a change in the view such that it becomes the key influence and focus in the view' (as defined in the methodology) resulting in a '**Substantial Adverse Effect**'. As the structure planting matures, the Proposed Development will become further assimilated into the landscape with views of the lower parts of the buildings increasingly filtered, particularly in the summer months, however, this assessment outcome would remain at Year 15.
- 14.8.95 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint D – View looking north-east across the Site from the Woolavington Road (adjacent to the Site boundary) (Medium Sensitivity)

- 14.8.96 From this location, historically, views of chimneys and built form were visible on the former ROF, however, these have now been demolished, leaving views towards the T-pylon run, and the edge of the buildings of the 2017 Planning Consent, with the village edge and rural landscape beyond.
- 14.8.97 The introduction of the Proposed Development would be openly visible to passing motorists from this location, with built form stepping up in height from the Woolavington Road towards the commercial unit(s). The land beneath the T-pylons would remain open, with a parkland area (Gravity Park) occupying much of this view. In addition, proposed residential development on the edge of Woolavington would be openly visible, although use of the Design Guide colour strategy would help larger scale built form to become absorbed into the surrounding landscape.
- 14.8.98 This road is currently not lit at night, although there would be glimpses of lighting within the village at present, and more noticeably in 2032, within the 2017 Planning Consent. Within the Proposed Development the introduction of built form up to the Woolavington Road would

introduce a considerably greater area which would be lit at night. However, the Lighting Assessment records a minor adverse effect to the night time view of residents on the Woolavington Road, and a negligible effect due to residual upward lighting leading to sky glow (**Appendix 14.5**).

- 14.8.99 Overall 'the proposed development would result in a change in the view such that it becomes the key influence and focus in the view' (as defined in the methodology) which would constitute a 'Very High' magnitude of effect at Year 1 resulting in a '**Substantial Adverse Effect**'. Due to the height and proximity of the proposed buildings, this effect would be likely to remain at Year 15.
- 14.8.100 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint E – View looking south west from the car park adjacent to The Causeway immediately to the south of the Huntspill River - Photomontage Viewpoint (800 m from Site boundary) (Walkers – High Sensitivity, Anglers and Motorists - Medium Sensitivity)

- 14.8.101 Historically, the buildings within the former ROF formed an incongruous element in this landscape, and subsequent views towards the built form of the 2017 Planning Consent occupy the central part of the view, although not breaking the skyline, and the views are filtered by maturing structure planting, and some intervening existing vegetation. (**Figure 14.33, Appendix 14.1**). The T-pylons run would also be openly visible from this location.
- 14.8.102 The Proposed Development is comprised of much larger buildings, and the commercial building(s) occupy a considerable part of the skyline, along with stacks above the roofline. There would also be likely to be views available towards the mobile gantry cranes operating within the rail terminus yards, albeit by Year 15 vegetation is maturing to break up views towards the lower parts of the building(s)/yard areas to a degree, as shown on the photomontages (**Figure 14.34 and 14.35, Appendix 14.1**). However, while the proposed buildings are of a large scale and mass, the use of the Design Guide colour strategy would help to assimilate them into the surrounding landscape.
- 14.8.103 Lighting would be visible within the 2017 Planning Consent from this location, and would be visible within parts of the Proposed Development, and although the large commercial building(s) would screen views of lighting within much of the southern part of the Site. It is likely that there would be views of lighting within the rail terminus yards from this location. The lighting assessment does not consider this location, however it does consider residents at Withy Grove Road just to the north and found that there would be a moderate adverse effect to residents due to a change in night time views and a negligible effect due to obtrusive light from residual upward light leading to sky glow. (**Appendix 14.5**).
- 14.8.104 For walkers, anglers and motorists, at Year 1 the Proposed Development would constitute a 'High' magnitude of effect as 'the proposed development would result in a change in the view such that it becomes the key influence and focus in the view' as defined in the methodology, resulting in a '**Substantial Adverse Effect**' which, given the height of the buildings would be likely to remain at Year 15.
- 14.8.105 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint F (previously VR17) – View looking west from the Causeway towards the Site (415 m from main Site) (Medium Sensitivity)

- 14.8.106 Historically, the buildings on the former ROF formed an incongruous element in this landscape, and subsequent views towards the built form of the 2017 Planning Consent occupy the central part of the view, and the views are filtered by maturing structure planting, and some intervening existing vegetation. The T-pylons run would also be openly visible from this location.
- 14.8.107 The Proposed Development's large scale built form and stacks would be visible to motorists along this stretch of the Causeway, breaking the skyline, and forming a dominant feature in views along the road, along with glimpses of the rail terminus, although intervening existing vegetation would break up the elevations to a small degree.
- 14.8.108 Lighting would be visible within the 2017 Planning Consent from this location, and would be visible within the more extensive Proposed Development. It is likely that there would be views of lighting within the rail terminus yards from this location. The lighting assessment found that there would be negligible effects to road users on the Causeway (**Appendix 14.5**).
- 14.8.109 For motorists, although use of the Design Guide colour strategy would help built form to become absorbed into the surrounding landscape, due to the 'addition of new and uncharacteristic conspicuous features and elements' (as defined in the methodology) this would constitute a 'High' magnitude of effect as 'the proposed development would result in a change in the view such that it becomes the key influence and focus in the view', resulting in a '**Substantial Adverse Effect**'. By Year 15 it is anticipated that the structure planting within the eastern part of the Site would have achieved a height in the region of 8-11.5m and would have further softened views for visual receptors, even during the winter months, however, given the scale of the changes, effects would not be likely to reduce further.
- 14.8.110 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint G – View looking south from Withy Road approaching East Huntspill - Photomontage Viewpoint (1.9 km to the main Site) (Residents High Sensitivity, Motorists Medium Sensitivity)

- 14.8.111 This view is intended to be representative of the views available to local residents within and around East Huntspill. This flat, rural landscape is more well vegetated than the land further south, and due to the flat nature of the land much of the wider landscape is obscured from view by intervening mature hedgerows and trees, resulting in a rural character to the view, despite the numerous electricity pylons. In 2032, the 2017 Planning Consent buildings would be unlikely to be visible, due to intervening vegetation as shown on the photomontage (**Figure 14.36, Appendix 14.1**). Within the Proposed Development, the upper parts of the large, commercial unit(s) and stacks would be just visible beyond intervening skyline vegetation, particularly during winter months when the trees are out of leaf. However, due to intervening vegetation it would not appear as a dominant feature in this view, as shown on the photomontages (**Figure 14.37 and 14.38, Appendix 14.1**).
- 14.8.112 In 2032, lighting within northern parts of the 2017 Planning Consent would be just visible, glimpsed between intervening vegetation. Lighting within the northern parts of the Proposed Development would also be visible at night, including lights within the rail yards. The lighting assessment does not consider the exact location of this viewpoint, however, it records a moderate adverse effect to residents at Withy Grove nearby due to change in night-time views and a negligible effect to residual upward light leading to sky glow, and in addition there is considered to be a minor adverse effect to the night-time view of residents at East

Huntspill and a negligible effect to residents at East Huntspill due to residual upward light leading to sky glow (**Appendix 14.5**).

14.8.113 This view appears predominantly rural and the introduction of the large scale built of the Proposed Development on the skyline in this rural view, albeit much is obscured by vegetation, would constitute 'the addition of new and noticeable uncharacteristic features and elements' (as defined in the methodology) for residents and motorists, resulting in a 'Medium' magnitude of effect and therefore, a **'Moderate Adverse Effect'** at Year 1 and Year 15.

14.8.114 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint H (previously VR18) – View looking north from the footpath BW28/2 to the east of Puriton (500 m from main Site boundary and 250 m from roundabout on Woolavington Road) (Medium Sensitivity)

14.8.115 From this location at present there are views across lower lying land to the north, including the Site, with lighting columns along the Gravity Link Road corridor to the east. However, by 2032 it is assumed that the approved residential development proposed for the foreground of this view would be complete, therefore predominantly obscuring the 2017 Planning Consent buildings which would otherwise be visible from much of the footpath. Once the Proposed Development is completed, some channelled glimpses of proposed large scale built form and stacks could be available, depending on the final design layout for the residential development. For residents on the northern edge of the residential development some partial views across the large scale built form and stacks within the Proposed Development would be available, although vegetation along the road corridor would soften and filter these views. Use of the Design Guide colour strategy would help built form to become absorbed into the surrounding landscape.

14.8.116 The foreground lighting of the village, the road and the new residential development, along with any glimpses of lighting that may be available within the 2017 Planning Consent would form the baseline context of this view. Changes as a result of the Proposed Development would include an increase in the lit area within the Site, although depending on the extent of the Site visible (according to the final design of the residential development) this is likely to be relatively modest. The lighting assessment found that there is considered to be a negligible effect to the night-time view of residents at Puriton, and a minor adverse effect due to residual upward light leading to sky glow (**Appendix 14.5**).

14.8.117 For walkers on the footpath, and residents within the adjacent residential development, the Proposed Development would constitute 'the addition of new and noticeable uncharacteristic features and elements' as defined in the methodology, and therefore a 'Medium' magnitude of effect resulting in a **'Moderate Adverse Effect'** at Year 1, this would reduce to a **'Minor Adverse Effect'** by Year 15 as vegetation continues to mature along the Gravity Link Road.

14.8.118 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint I (previously VR19) – View looking north from Bridleway BW28/1 adjacent to Home Covert – Photomontage Viewpoint (750 m from main Site boundary, 250 m from the Gravity Link Road) Photomontage Viewpoint (High Sensitivity)

14.8.119 From this elevated viewpoint along the ridge it is possible for walkers to see a large proportion of the Site. Historically built form has been present (the former ROF), just as in 2032 the buildings of the 2017 Planning Consent would be openly visible as shown on the

photomontage (**Figure 14.39, Appendix 14.1**). The large scale built form of the Proposed Development would be introduced into the middle distance of this view, just below the skyline in the case of the 10 m stack height but with some stacks breaking the skyline in the event of a requirement for 25m stacks, although the southernmost parts would be concealed by landform, as illustrated in the photomontages (**Figure 14.40 and 14.41, Appendix 14.1**).

- 14.8.120 Although lighting on the Proposed Development would be visible from this location, it is considered unlikely that there would be any walkers on this route after dark.
- 14.8.121 For walkers and riders on the bridleway, these changes would give rise to 'new and uncharacteristic conspicuous features and elements' in the existing view (as defined in the methodology) and as such are considered to cause a 'Very High' magnitude of effect and a **'Substantial Adverse Effect'** at Year 1. By Year 15 the proposed structure planting would have matured and have begun to soften views towards the lower levels of the buildings, however, the Year 1 effects would remain.
- 14.8.122 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint J (previously VR20) – View looking north from Hillside as it enters Puriton from the south (750 m from main Site boundary 75 m from the Gravity Link Road) (Medium Sensitivity)

- 14.8.123 The bund associated with the Gravity Link Road corridor screens many of the existing houses on the southern edge of the village, and by 2032 as vegetation on the bund matures, views towards the lower lying land to the north (and the Site within it) would reduce. In winter months, however, there may be small glimpses of parts of the large scale buildings of the 2017 Planning Consent in the middle distance. Although trees on the bund would form much of the skyline and filter the long views to the Mendips.
- 14.8.124 The Proposed Development, as it is considerably larger in extent and height, would be partially screened and filtered by the bund planting, with glimpses of the larger built form/stacks likely to be more available during winter months, although trees on the bund would still form much of the skyline.
- 14.8.125 There would be glimpses of lighting within the 2017 Planning Consent in 2032, and within the Proposed Development there is potential for lighting to be visible across a larger area. The lighting assessment found that there is considered to be a negligible effect to the night-time view of residents at Puriton and a minor adverse effect to residents at Puriton due to residual upward light leading to sky glow (**Appendix 14.5**).
- 14.8.126 Motorists and walkers would experience a changed view due to the introduction of very large scale built form proposed on the Site which would be just visible on the skyline in places and constitute 'the addition of new but perceptible uncharacteristic features and elements' as defined in the methodology, and therefore a 'Low' magnitude of effect and **'Moderate Adverse Effect'** at Year 1 which would remain at Year 15.
- 14.8.127 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint K (previously VR21) – View looking north west from Crancombe Lane as it passes/enters Woolavington - Photomontage Viewpoint (440 m from Site boundary) (Motorists, residents and walkers - Medium Sensitivity)

- 14.8.128 From this edge of the village, the Site is visible in the middle distance, and in 2032 large scale built form would be openly visible across the Site, although lower levels of buildings would be softened by maturing vegetation, and built form would not break the skyline. In addition, the new residential development on the edge of the village would be completed, extending the village towards the Site (**Figure 14.42, Appendix 14.1**) Due to the slightly elevated nature of the lane, walkers and residents would have views across the roof tops of the lower units across the Proposed Development, in addition to the large-scale commercial unit(s) which occupy a section of skyline along with the stacks, as shown in the photomontage (**Figure 14.43 and 14.44, Appendix 14.1**). The result is that built form would occupy the majority of this view, compared to the smaller proportion evident in 2032. Intervening existing vegetation and structure planting would help to further soften and assimilate views of the lower level of the buildings but upper parts and the stacks would remain on the skyline. The Design Guide colour strategy would help to assimilate the development into its surroundings.
- 14.8.129 In 2032 lighting would be visible across the Site and within the new residential approved development on the edge of the village. The Proposed Development is larger in extent and lighting would therefore be visible across a more extensive area. However, the Lighting Assessment found a negligible effect to the night time view of residents at Woolavington, and a negligible effect due to residual upward light leading to sky glow was anticipated. (**Appendix 14.5**).
- 14.8.130 For motorists, residents and walkers, at Year 1 the magnitude of effect is considered to be 'Very High' in that there would be the 'the addition of new and uncharacteristic conspicuous features and elements' as defined in the methodology, resulting in a '**Substantial Adverse Effect**'. By Year 15 the structure planting would have matured to a height of 8-11.5m which would help to further assimilate the development into its surroundings. However, due to the large scale nature of the buildings no reduction from Year 1 effects would be anticipated.
- 14.8.131 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint L (previously VR22) – View looking east along the A39 to the south of Puriton - Photomontage Viewpoint (850 m from main Site, 0 m from the Gravity Link Road junction) (Medium Sensitivity)

- 14.8.132 This view is experienced by drivers travelling along the A39 and the small number of residents living to the south of the A39, and comprises the new roundabout with its associated lighting, and Gravity Link Road corridor, which forms the dominant feature in the foreground, and defines a largely urban character. By 2032, the roadside vegetation and that planted in the centre of the roundabout would have matured to reduce views northwards towards the main Site (**Figure 14.45, Appendix 14.1**).
- 14.8.133 In 2032, the 2017 Planning Consent buildings would not be visible to motorists, since the road bund and associated maturing planting would obscure much of the view northwards, however, it is likely that residents would have views towards them from upper storeys. Similarly, it is not anticipated that the Proposed Development would be visible from this location from ground level due to the bund and maturing vegetation (**Figure 14.46 and 14.47, Appendix 14.1**). However, residents would be likely to have some views towards it from north facing windows in upper storeys.
- 14.8.134 Due to the 'addition of new but perceptible uncharacteristic features and elements' (as defined in the methodology) in views towards the flat agricultural landscape, resulting in a

'Low' magnitude of effect, the Proposed Development would give rise to a '**Minor Adverse Effect**' for residents and motorists, which by Year 15, would remain for residents but it is anticipated would reduce further for motorists to '**Negligible**' due to vegetation growth.

- 14.8.135 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location, these would be glimpsed during winter months by motorists, and seen from the upper storeys of the residential properties. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint M (previously VR24) – View looking east from Pawlett (2.4 km from the main Site) (Residents and Motorists Medium Sensitivity)

- 14.8.136 From this viewpoint, motorists and a small number of residents are able to discern the block of woodland in the Site's north western corner. In 2032, the 2017 Planning Consent would be barely visible, and the buildings would be largely screened by intervening vegetation. The Proposed Development's large scale built form, however, and the tops of stacks would be visible on the skyline, although lower parts of the buildings would be largely screened by intervening vegetation and the Design Guide colour strategy adopted would help to assimilate it into its surroundings. There would be likely to be some perception of lighting within the Proposed Development from this location, however, it would appear distant and be seen in the context of the existing M5 motorway corridor, and the village of Puriton.

- 14.8.137 The increased built form in the view would result in 'the addition of new but perceptible uncharacteristic features and elements' as defined in the methodology and, therefore, a 'Low' magnitude of effect, on balance, resulting in a '**Moderate Adverse Effect**' in Year 1. This would remain the same at Year 15.

- 14.8.138 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, further change to the assessment outcome would not be anticipated as a result.

Viewpoint N (previously VR25) – View looking east from Steart Drove BW25/3 Long distance trail (5.7 km from the main Site) (High Sensitivity)

- 14.8.139 Views from this area are very expansive and walkers can just discern the block of woodland in the Site's north western corner as part of a wide panorama, but no detail with the naked eye from this location. In 2032, the 2017 Planning Consent would be unlikely to be visible, with the buildings largely screened by intervening vegetation. The Proposed Development's large scale built form, however, would be just visible on the skyline, although lower parts of the buildings would be largely screened by intervening vegetation and the Design Guide colour strategy adopted would help to assimilate it into its surroundings.
- 14.8.140 There are already distant views towards lighting within Bridgewater and Burnham from this area, and there would be some very limited views towards lighting on the Site, although this would be unlikely to be obvious in the context of existing lighting in the area.
- 14.8.141 For walkers, the Proposed Development 'may go unnoticed as a small element in the view, or is not readily visible' as defined in the methodology, and this would be considered a 'Very Low' magnitude of effect, resulting in a '**Minor Adverse Effect**' in Year 1. This would remain the same at Year 15.
- 14.8.142 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), this would result in an increase in the proportion of the stacks visible above the commercial unit(s) from this location. However, this is a distant view and the change would be very small so that further change to the assessment outcome would not be anticipated as a result.

Viewpoint O (previously VR26) – View looking north east from the Quantock Hills (17 km from the Site) (Very High Sensitivity)

- 14.8.143 Given the distance between this location and the Site and the difficulty in identifying the features of the Site, in 2032 it is considered unlikely that the buildings within the 2017 Planning Consent would be perceptible. Depending on the weather conditions/visibility, on a clear day, it would just be possible for walkers to discern the larger elements of the Proposed Development from this location, although it would be set within the context of the flat Somerset landscape which includes numerous examples of large scale built form. The Design Guide colour strategy adopted would help to assimilate the development into its surroundings.
- 14.8.144 There are already distant views towards lighting within Bridgwater and Burnham from this area, and there would be some very limited views towards lighting on the Site. The lighting assessment found that there would be negligible effects to night-time views due to the Proposed Development (**Appendix 14.5**).
- 14.8.145 For walkers, the Proposed Development ‘may go unnoticed as a small element in the view’ as defined in the methodology, resulting in a ‘Very Low’ magnitude of effect and therefore a **‘Minor Adverse Effect’** in both Year 1 and Year 15. The Quantocks AONB officer was not concerned about the Proposed Development during consultation as noted in section **14.4.2**.
- 14.8.146 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), given the distance, and the elevation of the location, it is unlikely that the changes would be perceptible and there would be no further change to the assessment outcome as a result.

Viewpoint P (previously VR27) – View looking north from the bridge above the M5 – Photomontage viewpoint (5 km from the Site) (Low Sensitivity)

- 14.8.147 This viewpoint has been considered as a means by which to test the emerging parameters for the Proposed Development. For motorists, residents and walkers south of the Polden Ridge, there would not be any views of the 2017 Planning Consent as it would be screened by the ridge itself (**Figure 14.48, Appendix 14.1**). The buildings and stacks of the Proposed Development would not be visible from this location, and, given the well lit context of this location, it is unlikely that any views of lighting would be perceptible, therefore resulting in a magnitude of effect of ‘None’, and as a result there would be **‘No Change’** in both Year 1 and Year 15 (**Figure 14.49, Appendix 14.1**).
- 14.8.148 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), no further change to the assessment outcome would be anticipated as a result, as although the 25m stack height could just break the ridge, vegetation along the ridge top would mean that the stacks would be unlikely to be perceptible.

Viewpoint Q (previously VR29) – View looking south from the Mendip Hills (15 km from the Site) (Very High Sensitivity)

- 14.8.149 Given the distance between this location and the Site, and the difficulty in discerning the existing features on it, it would be unlikely that the 2017 Planning Consent would be visible. Within the Proposed Development much of the detail would not be perceptible from these hillsides, however, on clear days the large commercial unit(s) would be likely to be distantly visible although the Design Guide colour strategy adopted would help to assimilate the development into its surroundings. At this distance lighting within the rail yard areas to the north of the large commercial unit(s) would be likely to be just visible, however, the numbers of walkers on the hillsides at night would be likely to be small. The lighting assessment found that there would be negligible effects to night-time views due to the Proposed Development (**Appendix 14.5**).
- 14.8.150 For walkers, as a result of the existing context of views towards the flat Somerset landscape, which include some large scale built form, and the distance involved, the introduction of the

‘Proposed Development may go unnoticed as a small element in the view’ as defined in the methodology, resulting in a ‘Very Low’ magnitude of effect and therefore a **‘Minor Adverse Effect’** in both Year 1 and Year 15. The Mendips AONB officer was not concerned about the Proposed Development during consultation as noted in section 14.4.2.

- 14.8.151 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), given the distance, and the elevation of the location, it is unlikely that the changes would be perceptible and there would be no further change to the assessment outcome as a result.

Viewpoint R (previously VR30) – View looking south east from the Brent Knoll (8.5 km from the Site) (Very High Sensitivity)

- 14.8.152 Although this location is not as distant as the Mendip Hills, it is still quite far north of the Site, and given the distance between this location and the Site, and the difficulty in discerning the existing features on it, it would be unlikely that the 2017 Planning Consent would be visible. Within the Proposed Development much of the detail would not be perceptible from this elevated viewpoint, however, on clear days the large commercial unit(s) would be likely to be distantly visible set within the context of the M5 motorway and some large scale built form along its corridor. The Design Guide colour strategy adopted would help to assimilate the development into its surroundings. At this distance lighting within the rail yard areas to the north of the large commercial unit(s) would be likely to be distantly visible, although, the numbers of walkers on the hillside at night would be likely to be small, and views would be experienced in the existing context of large scale commercial/industrial buildings along the M5 corridor (and the motorway itself) which would be lit due to passing car headlights at night.
- 14.8.153 As a result of the existing context of views towards the flat, Somerset landscape, which include some large scale built form, and the distance involved, for walkers the ‘introduction of new but perceptible uncharacteristic features and elements (adverse change)’ as defined in the methodology, would result in a ‘Low’ magnitude of effect and therefore a **‘Moderate Adverse Effect’** in both Year 1 and Year 15.
- 14.8.154 In the event of a requirement for 25 m stacks (as opposed to the more likely 10 m), given the distance, and the elevation of the location, it is unlikely that the changes would be perceptible and there would be no further change to the assessment outcome as a result.

14.9 Further Mitigation

- 14.9.1 Significant landscape and visual effects have been identified within the LVIA, and in line with EIA best practice and recent IEMA guidance, further mitigation has been considered. However, due to the nature of the landscape and visual effects in this case, no further mitigation would be considered likely to change the assessment outcomes further, and therefore, no further mitigation is proposed.

14.10 Residual Effects

- 14.10.1 Residual effects would remain the same as operation stage effects at year 15, as due to the nature of landscape and visual effects, in this case no further mitigation is possible.
- 14.10.2 Refer to **Appendix 14.3 Landscape and Visual Impact Assessment Tables** for a summary of residual landscape and visual effects.
- 14.10.3 As would be anticipated with a Proposed Development of this scale, significant residual effects have been identified within those landscapes local to the Site. Of the local landscape character areas established as part of this LVIA to investigate a finer grain of change to local landscape character, effects on CA1, CA2, CA4, CA5, CA6 and CA7 have been identified as significant adverse. Residual adverse effects on CA3 Moors and Levels adjacent to the M5 have been identified as not significant, due to the existing characteristics of this local

landscape character area. In relation to the SLA, there would be significant adverse effects on both 'Levels and Moors' and 'Lowland Hills - Polden Hills' due to proximity to the Site, however, effects on 'Lowland Hills – wider area' would be not significant. In addition, effects on the Quantocks and the Mendips AONBs would be considered not significant.

- 14.10.4 In terms of visual effects, residual adverse effects on the views of all visual receptors within a 2.5 km radius have been identified as significant, with the exception of View H within Puriton, from which the intervening bund and maturing planting of the Gravity Road Link corridor, along with the approved residential development would reduce the extent of views available by operation year 15 to not significant. Residual adverse effects on all views from visual receptors beyond 2.5 km from the Site have been assessed to be not significant, this includes views from the sensitive receptors on the Quantocks and Mendips AONB. However, with the exception of visual receptors on Brent Knoll for whom effects would be considered significant due to a combination of location and the elevated views available.

14.11 Monitoring

- 14.11.1 There would be residual significant effects resulting from the Proposed Development. However, in this case, monitoring measures are not considered appropriate in relation to landscape and visual effects. This is because monitoring the landscape and visual effects would not be anticipated to result in any changes to the assessment outcomes.
- 14.11.2 During construction, protection measures for existing vegetation would be noted within the **FDCEMP**.
- 14.11.3 During detail design and operation, the **Design Guide** would ensure the design principles included in section 14.7 would be taken forward to detail design stage.
- 14.11.4 There would be on-going monitoring of the success of landscaping/planting within the Proposed Development, which is covered within the **Design Guide**.

14.12 Summary

- 14.12.1 This chapter considers the landscape and visual effects that are likely to arise from the Proposed Development. The following paragraphs provide a summary of the findings.

Key policies

- 14.12.2 Much of the LDO Site has historically been occupied by the industrial built form of the former Royal Ordnance Factory, and the Site is recognised within the local planning background documents, recorded as 'Puriton Energy Park' and within the Bridgwater Vision 2009.
- 14.12.3 The 2017 Planning Consent for the Site accepts the principle of large scale buildings on the Site, supported by local planning policy, which places emphasis on careful consideration of local landscape character, the setting of the Mendips and Quantocks Areas of Outstanding Natural Beauty, visual amenity and green infrastructure networks within the local landscape, and on the Site itself.

Headline methodology

- 14.12.4 The chapter examines the following as separate, although linked, considerations:
- Landscape effects; derived from changes in the physical landscape, which may give rise to changes in its character and how this is experienced. This may, in turn, affect the perceived value ascribed to the landscape.

- Visual effects; related to the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects on visual amenity value of the views from surrounding uses.

14.12.5 The broad study area for landscape effects is 5 km, with a more detailed study of local landscape character concentrated within 2 km of the Site. The study area for visual effects extends across the area from which the Site can be seen, in this case, views of the Site are available, albeit distantly, from the Mendip Hills and Quantock Hills, located approximately 15 km and 17 km away respectively

Baseline conditions

14.12.6 At the time of writing the majority of demolition and remediation works have been completed, on the Site, and the Gravity Link Road to the A39 is largely complete according to the 2017 Planning Consent. Areas of the Site outside of the former Royal Ordnance Factory are predominantly green field. To reflect the evolving conditions on the Site, the assessment refers to a baseline in 2032 which considers the Site as it will be at that time, with the 2017 Planning Consent in place and large scale built form across the central areas, and vegetation establishing within the layout, including along the Gravity Link Road.

Mitigation

14.12.7 Mitigation measures, which have been 'in built' into the design include locating the tallest built form in the central part of the Site with the stepping down of building heights to the south, in reference to the scale of the Woolavington Road; the retention of existing vegetation around the much of the periphery of the Proposed Development, and the structural tree and woodland planting proposed to help integrate built form into its surroundings; a green edge to Woolavington Road, and open space to enhance the perception of a distinct edge to the separate villages and provide opportunities for biodiversity; a network of pedestrian and cycle routes, careful design of the lighting strategy and a Design Guide colour strategy to help assimilate the buildings into their landscape setting.

Likely effects

14.12.8 The LVIA considers the worst case scenario for likely effects based on the parameters established in the suite of parameter plans, and the parameters for the Proposed Development include some very large-scale buildings, with stacks rising above the buildings. As a result there is the potential to give rise to substantial adverse effects on landscape character and the views of some people living and working nearby, and passing through the area.

14.12.9 The chapter records that during construction, there would be substantial adverse effects on:

14.12.10 Local landscape character, as areas within the Site would undergo an 'intensive change over a limited area' for the duration of the works, and there would be substantial adverse effects on the setting of nearby local landscape character areas due to the influence of views towards the construction works; and

- Visual amenity as the construction of the Proposed Development would potentially be visible to all visual receptors. For those receptors within the immediate locality these would be substantial, however, with distance the effects would diminish.

14.12.11 On completion of the construction works, buildings and green infrastructure would be in place, although vegetation would be limited in size at this stage, there would be substantial adverse effects on:

- Local landscape character, as areas within the Site would undergo an 'intensive change over a limited area', and there would be substantial adverse effects on the setting of

nearby local landscape character areas due to the influence of views towards the large scale buildings; and

- Visual amenity as the Proposed Development would potentially be visible to all visual receptors. For those receptors within immediate locality these would be substantial, however, with distance the effects would diminish.

14.12.12 It should be noted that while both the construction works and the operational development would theoretically be visible from the more distant viewpoints within the Quantocks and Mendips Area of Outstanding Natural Beauty, they would be difficult to pick out with the naked eye.

14.12.13 The residual effects are considered to be 15 years from completion of the construction works, this allows time for proposed vegetation to mature, and achieve its design intentions. In this case, due to the large scale of the buildings, although this maturation would soften views and assimilate the development in its setting, providing an attractive environment for those living and working within the Proposed Development, levels of effects would remain as for Year 1.

14.12.14 In summary substantial adverse landscape and visual effects are anticipated as a result of the Proposed Development.

14.12.15 There would be significant adverse effects on landscape character within the Site itself, its immediate surroundings within the Levels and Moors to the north, Puriton and Woolavington and the landscape along the northern flank of the Polden Hills.

14.12.16 There would be significant adverse visual effects experienced by motorists on the M5 motorway, and Batch Road, the residents of Puriton and Woolavington, those travelling between the two villages along Woolavington Road, motorists and walkers along the Causeway, motorists and residents at East Huntspill and Pawlett, walkers and riders on the Polden Ridge, and walkers on Brent Knoll.

14.12.17 Although the Proposed Development would be just visible from the Mendips and Quantocks AONBs, no significant adverse effects are anticipated due to the distance involved and the existing context of the low lying Somerset landscape which lies within their setting.

Conclusion

14.12.18 The Proposed Development would provide a Smart Campus and Community, with associated sports, recreation and amenity facilities, and improved links to the surrounding areas.

14.12.19 The adverse landscape and visual effects, which unavoidably result from the introduction of a development of this scale, have been set out within this chapter, and should be considered in the context of the Site, much of which has historically been populated by industrial buildings, and recently obtained planning permission in 2017 for large scale buildings. It should be noted that whilst the 2017 Planning Consent was granted for the Huntspill Energy Park, the safeguarded land uses were also considered and assessed cumulatively in the Environmental Statement. The safeguarded land uses included some very tall energy generating elements with stacks up to 105 metres high, and although these elements did not obtain planning permission at that time, they illustrate the intention that large scale elements could be considered.

14.12.20 The mitigation proposed, as set out in the **parameter plans** and **Design Guide** will facilitate a high quality of design as the project moves forward.

14.12.21 The Design Guide provides a unique opportunity to offer both mandatory principles for mitigation, and guidance to create a sense of place, specific to Gravity and to its location. It establishes the key spatial qualities and characteristics to support the development of a

cohesive and aspirational place, whilst creating flexibility and creative opportunities for future potential occupiers.

14.13 Referencing

14.13.1 This chapter refers to the following best practice guidance documents:

- Landscape Institute and Institute of Environmental Management and Assessment, 2013 Guidelines for Landscape and Visual Impact Assessment (3rd Edition);
- Christine Tudor, October 2014, An Approach to Landscape Character Assessment;
- Landscape Institute, March 2017, Technical Advice Note Tranquillity – An Overview 01/2017 (Revised); and
- Landscape Institute, June 2019, TGN 06/19 Visual Representation of Development Proposals.

15 Climate Change

15.1 Introduction

- 15.1.1 This chapter presents the findings of an assessment of the likely significant effects of the Proposed Development on:
- the impact of the Proposed Development on climate change ('Greenhouse Gas Emissions Assessment'); and
 - the impact of climate change on the Proposed Development ('Climate Change Risk Assessment').
- 15.1.2 These assessments have different policy contexts, guidance documents, methodologies, baseline conditions, potential impacts, and mitigation measures. This Chapter therefore presents the Greenhouse Gas Emissions Assessment and Climate Change Risk Assessment separately. Following this introduction, this Chapter is structured as follows:
- Part 1: Greenhouse Gas (GHG) Emissions Assessment – a qualitative assessment of the Proposed Development's impacts on climate change by its potential to emit GHGs. This section also outlines what mitigation measures have been embedded within the Proposed Development to reduce GHG emissions during construction and operation.
 - Part 2: Climate Change Risk Assessment (CCRA) – outlines the projected climatic changes in the region, identifies receptors vulnerable to climate change, and the mitigation measures to address climate change, embed adaptation measures and improve resilience.
 - Summary and References.
- 15.1.3 This chapter should be read in conjunction with Chapter 8 Human Health, Wellbeing and Inclusion, Chapter 9 Transport and Access, Chapter 11 Air Quality, Chapter 12 Biodiversity, Chapter 12 Water Environment, Chapter 13 Landscape and Visual, and Chapter 16 Cultural Heritage.
- 15.1.4 The associated appendices for this chapter are:
- Appendix 15.1: Climate Change Policy and Guidance
 - Appendix 15.2: Figures
 - Appendix 15.3: Climate Projections Data
- 15.1.5 This Chapter has been prepared by Stantec. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.

Part 1: GHG Emissions Assessment

15.2 Policy, Legislation, Guidance and Standards

National Policy and Legislation

15.2.1 The following legislation and policy has informed the assessment of effects within this section. Further details are provided in **Appendix 15.1**.

- The Paris Agreement, 2015
- Climate Change Act (CCA) 2008, as amended
- Carbon Budget Orders 2009, 2011, 2016 and 2021
- Town and County Planning (Environmental Impact Assessment) Regulations 2017
- National Planning Policy Framework (NPPF) 2021
- Planning Practice Guidance (PPG) 2019
- The Road to Zero 2018
- The Ten Point Plan for an Industrial Revolution, 2020
- Transport Decarbonisation Plan, 2021

Guidance

15.2.2 Several standards and guidance documents have been used to inform the GHG emissions assessment methodology and potential mitigation measures. Full details of how the following documents have been considered in the GHG emissions assessment is provided in **Appendix 15.1**:

- Environmental Impact Assessment (EIA) Guidance on assessing greenhouse gas emission and significance (IEMA, 2017).
- Publicly Available Standard (PAS) 2080:2016 Carbon management in Infrastructure (British Standards Institute (BSI), 2016).
- World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) Greenhouse Gas Protocol guidance (WBCSD and WRI, 2004).

Local Policy

Climate Emergency

15.2.3 In 2020, SDC released a Climate Emergency Strategy and Action Plan which sets out six areas of focus and a series of actions to reduce/address the climate and ecological crisis. The six areas are travel, waste, energy & buildings, business & economy, food & agriculture and nature. The Action Plan sets out several actions which seek to reduce GHG emissions, including improving public transport infrastructure, delivering carbon neutral housing, and promoting climate change awareness.

15.2.4 In addition, the five Somerset local authorities have jointly developed Somerset's Climate Emergency Strategy (SCES) (Climate Resilient Somerset, 2020). The aim of the strategy is to reduce carbon emissions in the county and make Somerset a county resilient to the

inevitable effects of Climate Change. The strategy includes the goal of making Somerset carbon neutral by 2030. Gravity is referenced several times in the SCES and is identified as one of the key developments in Somerset that will play an important role in delivering the clean growth agenda.

Sedgemoor Local Plan 2011-2032

15.2.5 A summary of the relevant planning policy within the Sedgemoor Local Plan 2011-2032 is provided below:

- Policy S4 Sustainable Development Principles requires development proposals to contribute to *“Mitigating the causes of climate change and adapting to those impacts that are unavoidable”*.
- Policy S5 Mitigating the Causes and Adapting to the Effects of Climate Change: *“Development should seek to reduce greenhouse gas emissions and contribute to mitigating the causes of climate change. Proposals for zero carbon development will be strongly supported. Development should contribute to all of the relevant following objectives:*
 - *Minimising of natural resources by the use of sustainably sourced materials;*
 - *Reuse and recycling of materials where appropriate;*
 - *Minimising of greenhouse gas emissions;*
 - *Incorporating energy efficiency;*
 - *Reducing waste;*
 - *Encouraging modes of transport other than the car; and*
 - *Utilising renewable and low carbon energy (including decentralised energy) where appropriate, taking into account the need to safeguard amenity, the natural, built and historic environment, and landscape.”*
- Policy D24 Pollution Impacts of Development requires planning applications to be supported by assessments relating to carbon emissions.

Puriton Energy Park Supplementary Planning Document (SPD) 2012

15.2.6 The Puriton Energy Park SPD, adopted March 2012, sets out how the allocation for an Energy Park on the site of the former Royal Ordnance Factory should be developed. The SPD identifies relevant policies for the Energy Park, including those regarding climate change and low carbon energy generation.

15.2.7 The SPD sets out the major power generation likely to be used on site, including combined cycle gas turbine or combined heat and power plant and energy recovery processes, and potential secondary power generation including microgeneration such as biomass, small scale wind turbines or photovoltaic (PV) cells, and notes that any proposed manufacturing uses should involve clean process that relate or complement the renewable and low carbon generation and green technologies on site.

15.2.8 It also provides key considerations for landscape, including use of additional trees to provide summer shade and carbon capture benefits.

Bridgwater Vision 2015

- 15.2.9 The Bridgwater Vision, updated and published in December 2015, provides a framework for the planned growth of Bridgwater and states within the Vision that *“In 2060 Bridgwater will be an energy conscious town known for its ambitious approach to sustainability and low carbon living.”*
- 15.2.10 The document includes a section on sustainability which highlights the key environmental consideration of efficient resource use: *“including minimal waste generation during construction and in use using WRAP protocols, zero to landfill policies, anaerobic digestion facilities and CHP incineration.”*
- 15.2.11 The document also states that *“new development within the area will need to reflect the area’s highly visible position along the M5 corridor through high profile, contemporary and highly sustainable (zero carbon) buildings.”*
- 15.2.12 The long term vision for the locality also identified the former Royal Ordnance Factory site, now known as Gravity, as a transformational opportunity to restructure the local economy and more towards a higher value model. This informed the Sedgemoor Core Strategy and site allocation for redevelopment and regeneration, and this informed the designation of the enterprise zone to attract international investment, and the current local plan.
- 15.2.13 Guidance for new developments is available and includes specific approaches to deal with the headline issues which are; increased risk of high temperatures in summer, flooding in winter, extreme weather events, subsidence due to ground conditions variability and general baseline warming which affects design benchmarking.
- 15.2.14 This is Gravity Ltd, has considered the policy context locally and nationally, and in response have developed the Clean and Inclusive Growth Strategy to shape and guide the re-imagination of the Site. This is driven by a review of the UN Sustainable Goals and the Governments Grand Challenge of Clean Growth. Gravity, is proposing a focus on large scale advanced manufacturing to secure international investment, create high value jobs, and deliver this in ways that are designed to reduce GHG emissions. This is moving away from previous energy solutions on site to the import of renewable energy via the grid, and working to secure manufacturers that can play an active strategic role in helping the UK economy shift into a lower carbon model, for example, through the manufacturing of electric vehicles, to accelerate progress towards a net zero carbon economy.

15.3 Consultation

- 15.3.1 The EIA Scoping Report (**Appendix 5.2**) identified the proposed scope and approach of the GHG emissions assessment. SDC provided its EIA Scoping Opinion for Gravity September 2021 (**Appendix 5.3**). SDC’s comments regarding GHG emissions are set out in **Table 15.1** below. SDC’s comments regarding climate resilience and adaptation are set out in **Section 15.13**.
- 15.3.2 Further consultation was undertaken with SDC via email correspondence.

SDC Scoping Comments	Response
<p>The Council agrees that Climate Change should be scoped into the ES. Overall, the scope and methodology set out is considered reasonable and fits in with IEMA guidance, as well as SDC's recently published Climate Emergency Strategy and Action Plan. Given the UK has legally binding GHG emission reduction targets we would recommend the scope explicitly includes reference to how the EIA will give due consideration to how the project will contribute to the achievement of these targets.</p>	<p>The UK's legally binding targets are set out in Table 15.5. A series of mitigation measures have been embedded within the design which will help to reduce the GHG emissions associated with the Proposed Development, set out in Section 15.6. Additional mitigation measures to be considered as the design progresses and occupiers come forward is set out in Section 15.8.</p>
<p>We note that in relation to GHG emissions it is proposed to take into account sources from both construction and operational stages. A review of the potential GHG emission sources during construction and operation should ensure we are able to understand expected emissions from the site, which will help with our pledge to work towards carbon neutrality by 2030 in the district. We look forward to reviewing the details as part of the Environmental Statement.</p>	<p>A review of potential GHG emission sources during construction and operation is set out in Section 15.7. As noted above, measures to reduce these emissions are set out in Sections 15.6 and 15.8.</p>
<p>A qualitative assessment is proposed in the technical note, justified on the basis of this methodology being acceptable where mitigation has been agreed early on in the design phase. The technical note refers to embedding several mitigation measures to reduce GHG emissions, referring to a Clean and Inclusive Growth Strategy and creation of a low carbon campus. In our Climate Emergency Action Plan and Local Plan, we have included a focus on clean growth, which the technical note has captured with the mention of providing low and zero carbon energy infrastructure, creating green-collar jobs and transitioning to net zero transport; therefore supporting low carbon economic growth overall. It is important that these factors are followed through in order to keep the emissions in the operation stage to a minimum. We would therefore agree that the qualitative assessment proposed is appropriate and proportionate, provided the details of the mitigation measures referred to can be secured with the necessary certainty as part of the Local Development Order. Mitigation measures should therefore be set out in detail as part of the Environmental Statement and other relevant LDO material.</p>	<p>The Gravity Clean and Inclusive Growth Strategy is underpinned by a review of the UN Sustainable Development Goals, to identify those which are particularly relevant to this site. This review resulted in themes and suggested implementation priorities which has informed the development process which has led to the LDO.</p> <p>The approach to the mobilisation of the smart campus is to connect to national scale energy through the National Grid, providing renewable energy on site. This is a shift away from the energy generation on site previously considered and factored into the ES. Whilst those former energy uses were 'safeguarded' and subject to separate applications, Gravity are proposing to move into different energy solutions to actively reduce GHG emissions and this is a significant benefit.</p> <p>Attracting the right occupier with shared ambitions is key to delivering the outcomes sought. Therefore, the whole proposition at Gravity, including the LDO which is a marketing tool to attract international investment and create green collar jobs.</p> <p>The transport strategy approach has been co funded and shared with SDC at an early stage in December 2020. This seeks to focus on transport decarbonisation and smart mobility, with rail restoration to provide both passenger and freight services as part of the overall proposal.</p> <p>It is therefore essential that the whole approach is considered from concept to energy provision, to</p>

	transport solutions, to understand the smart campus vision and ambition and how it translates into delivery on the ground. Low and zero carbon energy infrastructure, creating green-collar jobs and transitioning to net zero transport; therefore supporting low carbon economic growth overall.
In our experience of projects of this scale emissions during the construction phase are likely to be high. It is therefore essential that Gravity operates at a low/zero carbon capacity in order to minimise its impact on the environment. In recognising the inevitable carbon emissions in the construction stage of development, this is only valuable if efforts are made to offset those emissions, for example by planting trees in the local area; and to reduce those emissions, for example by using low carbon building materials, recruiting a local workforce to minimise travel to the site etc.	<p>Construction effects are long term but temporary. Gravity will be working with occupiers to shape design and construction processes to minimise emissions and would expect the details submitted through the compliance processes to confirm methodology.</p> <p>The workforce strategy is driven by the Skills Charter to optimise the use of local labour and the Business Charter seeks to utilise local business where possible. A bespoke transport strategy geared around transport decarbonisation with rail restoration and bespoke public transport services aligned to shift patterns will be central to achieving planning outcomes to minimise emissions.</p>

Table 15.1 SDC Scoping Opinion and Response

15.3.3 Somerset County Council (SCC) also provided a response to the Scoping Opinion as follows:

“As you will be aware, SCC, along with the other District Councils in Somerset all passed resolutions declaring a climate change emergency. Working jointly together, all of the Somerset Councils produced the Somerset Climate Emergency Strategy (SCES) document, published in 2020. This sets out Somerset’s aspiration to be carbon neutral by 2030 and to build our resilience for and adapting to the impacts of a changing climate. 3 Clear goals are set out in this document:

- *To decarbonise local authorities, wider public sector and reduce our carbon footprint;*
- *To work towards making Somerset carbon neutral by 2030; and*
- *Making Somerset prepared for and resilient to the impacts of climate change.*

The Gravity scheme is referenced several times in the SCES as being a great example of how a new development needs to be delivered and constructed in order to reach our climate change goals. The clean growth agenda lies at the heart of the SCES. The Gravity project is identified as one of the key development projects that will play an important role in delivering the clean growth agenda. In particular, delivering low carbon growth, climate resilient industries, and providing a range of high value jobs that will help Somerset reach its net zero future.

A number of different sectors that will have major impacts on our ambition to become carbon neutral are outlined in the SCES. These include amongst others, Energy, Transport, Local Economy and water resources. Whilst it is acknowledged that the Scoping report is not a planning application, hence many specific details will only emerge with any subsequent planning application(s), it is noted that the key objectives and goals of the SCES align with details outlined in the Gravity Scoping Opinion. Various key Strategies referred to in the Scoping Report that will underpin the Gravity development include a Clean and Inclusive Growth Strategy, an Energy Strategy, Water Strategy and a Travel Plan. These will help deliver an integrated live, work, and play living environment which will respond positively to the challenge of clean growth and transport decarbonisation.

SCC welcome the key principles to address climate change that have been outlined in the Scoping Report, in particular reducing need to travel, providing quality pedestrian and cycle links, good public transport and rail connectivity. The Energy Strategy looks to increase low carbon power generation, energy storage and management on site. The construction of the various new buildings on site will be subject to a Sustainable Procurement Plan in order to reduce waste generation and to maximise energy efficient buildings.

From a climate change perspective, SCC are keen to ensure that the Gravity project delivers the goals of the SCES. SCC welcomes the clear ambition of the Gravity project to deliver clean growth and would welcome the opportunity to be consulted on any subsequent development proposals.”

15.4 Methodology

Study Area

- 15.4.1 The GHG emissions assessment study area includes the Site and extends to include activities that occur beyond the Site boundary, such as the generation of electricity off site. As GHG impacts are global and cumulative with all other sources of emissions, no specific geographical study area is defined for the identified GHG emission sources that are set out in **Table 15.2**.

Baseline Data Collection

- 15.4.2 A high-level review of existing land use and associated activities on Site has been undertaken to identify the baseline GHG emissions. This includes a review of Chapter 11 Air Quality and the supporting appendices, along with the UK Carbon Budgets and UK local authority GHG inventory data (DBEIS, 2020).
- 15.4.3 A review has also been undertaken of relevant reports that will be submitted with the LDO including the Energy Strategy and Waste Strategy. The Clean and Inclusive Growth Strategy, available on the Gravity website, has also been reviewed. Where information from reporting outside the ES has been considered, all relevant information to inform the assessment of likely significant effects on the environment has been summarised within this Chapter.
- 15.4.4 The 2032 Baseline takes into consideration the carbon budgets for this time period, which the UK Government is legally bound to achieve, and anticipated policy changes such as revisions to Approved Document Part L of the Building Regulations. In addition, the 2032 Baseline considers several technological advances which are extremely likely to come forward, including the progressive decarbonisation of the National Grid, and increased uptake of Electric Vehicles. However, it is acknowledged under Limitations below that it is not possible to anticipate all technological advances which may come forward and result in changes to GHG emissions.

Sensitive Receptors

- 15.4.5 GHG emissions have a global effect rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global climate has therefore been treated as a single receptor. Given the global scale and severe consequences of climate change and limited recoverability, the receptor sensitivity is considered to be high.

Assessment Methodology

- 15.4.6 There is no nationally adopted method for assessing climate change within EIA and therefore the assessment approach draws upon IEMA guidance (IEMA, 2017). It identifies that all GHG emissions will contribute to climate change and thus might be considered

significant, this is set out further in paragraphs 15.4.14-15.4.20. It therefore suggests the impact of a development on climate should be based on its potential to emit GHGs.

- 15.4.7 The GHG emissions assessment will be based on the broad parameters of the Proposed Development, as the design will be progressed subsequently.
- 15.4.8 IEMA guidance emphasises the need for proportionality in the context of national, sector and local GHG emissions. The guidance recognises that qualitative assessments are acceptable, particularly where mitigation measures are agreed early on in the design stage and is agreed during the EIA scoping stage with stakeholders. Taking a qualitative approach has been agreed with SDC as appropriate and proportionate for the Proposed Development at scoping. The Proposed Development has embedded several measures to reduce GHG emissions associated with the design and construction, outlined in Section 15.6 below. In addition, there is anticipated to be limited emissions on Site once the Proposed Development is operational.
- 15.4.9 The GHG Protocol (WBCSD and WRI, 2019) categorises direct and indirect emissions into three broad scopes:
- *Scope 1*: all direct GHG emissions;
 - *Scope 2*: indirect GHG emissions from the generation of purchased electricity, heat, or steam; and
 - *Scope 3*: other indirect emissions, such as the extraction and production of purchased materials and fuels, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc.
- 15.4.10 The scope of the GHG Emissions assessment is set out in **Table 15.2** below.

Stage of Development	GHG Protocol	Activity Assessed
Demolition/ Construction	Scope 1	Enabling activities, land clearance and construction processes such as emissions resulting from the combustion of fuels for vehicles, plants or equipment used for construction of the Proposed Development and emissions released by soil movement
	Scope 2	Emissions associated with electricity needed for plant and welfare facilities.
Operation	Scope 1	Emissions associated with transport.
	Scope 2	Emissions associated with purchased electricity from the National Grid and distribution network during operation of the Proposed Development, for example emissions associated with the Energy Strategy.

Table 15.2 GHG Emissions Sources and Qualitative Scope

- 15.4.11 During operation of the Proposed Development, it is anticipated that all power will be supplied from the National Grid and/or through the Distribution Network Operator (DNO). It is unlikely there would be direct Scope 1 emissions associated with energy generation in the Proposed Development, as the Energy Strategy does not identify burning gas as a primary energy generation technology at this stage (Stantec, 2021).
- 15.4.12 Indirect Scope 3 emissions are emitted from activities which are predominantly outside of Gravity's control, for example, waste disposal and emissions related to the supply chain of

construction materials. It is therefore difficult to assess these accurately and meaningfully at the early stage of a project and it is not considered appropriate or proportionate in the context of the Proposed Development and the EIA Regulations.

- 15.4.13 IEMA guidance recognises that the assessment of GHGs should be proportionate in the context of EIA. Therefore Scope 3 emissions have been scoped out of further assessment as it is not considered proportionate to the Proposed Development within the context of the EIA. Embedded and further mitigation that reduces GHGs, including indirect Scope 3 emissions, associated with the Proposed Development are considered within the assessment.

Determining Significance

- 15.4.14 There is an absence of significance criteria or defined threshold for determining the significance of effects resulting from GHG emissions in EIA. Significance of effect is therefore determined using professional judgement, and consideration of the following elements:
- Appraisal of the Proposed Development's emissions in the context of national, regional and local emissions.
 - *IEMA EIA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017).*
 - How the Proposed Development has embedded design features to reduce GHG emissions and identified opportunities for further mitigation in the Proposed Development's design and delivery.
- 15.4.15 IEMA guidance identifies three underlying principles to inform the assessment of significance and conclude that:
- *"all projects create GHG emissions that contribute to climate change;*
 - *climate change has the potential to lead to significant environmental effects;*
 - *there is a GHG emission budget that defines a level of dangerous climate change whereby any GHG emission within that budget can be considered as significant."*
- 15.4.16 Therefore, in the absence of any significance criteria or a defined threshold, IEMA recommends that all GHG emissions should be considered as significant, and that the EIA should ensure the project addresses their occurrence through mitigation.
- 15.4.17 IEMA guidance goes on to say that a projects carbon contribution should be contextualised against sectoral, local or national carbon budgets as this will provide a sense of scale. The methodology applied to this assessment uses a 'magnitude of impact' that takes into consideration the impact of GHG emissions generated by the Proposed Development on national, regional and local GHG emissions targets, outlined in **Table 15.3**. The level of effect will be based on the considerations identified above and the matrix in **Table 15.4** below.

15.4.18

Magnitude	Measure of Impact
Large	A large impact considered to be of national scale.
Moderate	A moderate impact considered to be of regional scale.
Small	A small impact considered to be of local scale.
Negligible	An impact considered to be beneath level of perception.

Table 15.3 Magnitude of Impacts

- 15.4.19 GHG emissions have a global effect rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global climate has therefore been treated as a single receptor. Given the global scale and severe consequences of climate change and limited recoverability, the receptor sensitivity is considered to be high.

Magnitude	Receptor Sensitivity
	High
Large	Major to Substantial
Moderate	Moderate to Major
Small	Minor to Moderate
Negligible	Negligible to Minor

Table 15.4 Significance of Effects Matrix

- 15.4.20 In accordance with IEMA guidance, which states all GHG emissions might be considered significant due to the global severity of climate change, all effects stated in **Table 15.4** above are considered to be **Significant**.
- 15.4.21 The assessment takes account of embedded and further mitigation. Any effect that has no mitigation is considered to have a national scale effect, and therefore large magnitude of impact, as unmitigated GHGs have the potential to impact national carbon budgets. Effects that have been mitigated but are still expected to emit GHGs, are considered to have a regional or local scale effect depending on the activity being assessed as the emitted GHGs have the potential to impact local or regional baseline emissions and carbon targets. In line with IEMA guidance, all effects are considered significant but will be of national, regional or local significance.

Limitations

- 15.4.22 Given the nature of the LDO, the assessment has been based on high level information. This has been taken into consideration through the use of a qualitative approach to assessing the GHGs of the Proposed Development.
- 15.4.23 The trajectory of GHG emissions into the future is dependent on influences outside of the Applicant's control, for example Government policy and global technology and economic shifts, which are difficult to predict. The UK carbon budgets are legally binding, and the Government have an array of policies and levers to be deployed if the carbon budgets are not likely to be met.

15.5 Baseline Conditions

Current State of the Environment

National and Regional Emissions

15.5.1 This section establishes the existing GHG emissions at a national and regional level. GHG emissions do not have a local receptor as, once they are emitted, they are not limited to geographic boundaries.

15.5.2 **Table 15.5** sets out the UK carbon budgets from 2008 until 2017.

UK Budget	Carbon budget level (million tonnes carbon dioxide equivalents - MtCO ₂ e)	Reduction below 1990 levels	UK Emissions
1st carbon budget (2008 to 2012)	3,018 MtCO ₂ e	25%	2,982 MtCO ₂ e
2nd carbon budget (2013 to 2017)	2,782 MtCO ₂ e	31%	2,398 MtCO ₂ e

Table 15.5 2008-2017 UK Carbon Budget

15.5.3 From a national perspective, in 2019, UK total GHG emissions were estimated to be 454.8 million tonnes carbon dioxide equivalents (MtCO₂e), a decrease of 2.9% compared to 2018 (DBEIS, 2021). National GHG emissions in 2019 have decreased by 43.8% since 1990 (DBEIS, 2020).

15.5.4 The Department for Business, Energy & Industrial Services (DBEIS, 2020) sets out the CO₂ emissions estimates from a number of sources for 2005-2018, and is the most up to date available figures for the UK, Somerset and Sedgemoor. The CO₂ estimates for 2018 is presented in **Table 15.6** below.

	Industry and Commercial (ktCO ₂)	Domestic (ktCO ₂)	Transport (ktCO ₂)	Land Use, Land Use Change and Forestry (ktCO ₂)	Total (ktCO ₂)
UK	133,293.3	96,429.8	126,801.1	-11,699.9	344,824.3
Somerset	962.3	785.1	1,505.5	15.8	3,268.7
Sedgemoor	220.0	165.1	450.9	29.4	865.4

Table 15.6 National, Somerset and Sedgemoor CO₂ estimates for 2018

15.5.5 Sedgemoor accounts for approximately 26% of the total CO₂ emissions in Somerset, and 0.25% of the total UK emissions.

Local Emissions

15.5.6 The Site comprises 263 ha of open flat land. There are currently limited GHG emissions from the Site. Scattered trees and shrubs across the Site, as well as those clustered in the

northwest corner, along the railway line, and along the southern boundary, may provide a limited amount of carbon sequestration on site.

2032 Baseline

National and Regional Emissions

- 15.5.7 The Climate Change Act 2008, as amended, requires the government to set five-yearly carbon budgets, after taking advice from the Committee on Climate Change (CCC). The budgets are fixed in advance and set five-year caps on the total GHG emissions allowed to ensure the UK meets its emissions reductions commitments.
- 15.5.8 The carbon budgets enable net increases in emissions to be managed within the carbon budgets by balancing with performance in other sectors. Governments can use an array of policies and levers to achieve the net reductions necessary to meet the carbon budgets whilst taking an economy-wide and national approach to securing overall emissions reductions whilst facilitating other objectives including economic growth, energy security and levelling up.
- 15.5.9 The carbon budget for England for the period 2023-2026 is set to reduce GHG emissions by an average of 51% lower than the 1990 baseline emissions, as set out in **Table 15.7** below. The 6th carbon budget, for the period 2033-37, was accepted by the Government in April 2021 and adopted into law in July 2021. It is the first budget to consider the UK's net zero target by 2050 with a trajectory that is consistent with the Paris Agreement.

UK Budget	Carbon budget level (million tonnes carbon dioxide equivalents - MtCO ₂ e)	Reduction below 1990 levels
3 rd carbon budget (2018 to 2022)	2,544 MtCO ₂ e	37% by 2020
4 th carbon budget (2023 to 2027)	1,950 MtCO ₂ e	51% by 2025
5 th carbon budget (2028-2032)	1,725 MtCO ₂ e	57% by 2030
6 th carbon budget (2033-2037)	965 MtCO ₂ e	78% by 2035

Table 15.7 2018-2037 UK Carbon Budget Targets

Local Emissions

- 15.5.10 As set out in **Chapter 5**, the 2032 baseline comprises the consented Huntspill Energy Park (HEP) (excluding safeguarded land for energy generation), local approved developments and the Hinkley C overhead lines. The HEP planning consent allowed for up to 32,150 sqm of B1a, b or c buildings, up to 43,600 sqm of B2 buildings and up to 99,462 sqm of B8 buildings. Due to the outline nature of the LDO, the exact use of these buildings was not defined. However, due to the scale and use class, if implemented the HEP would generate GHG emissions.
- 15.5.11 It is assumed that the buildings of HEP will need to comply with the 2013 Building Regulations at the Reserved Matters stage. An uplift to the energy efficiency requirements of buildings set by the Building Regulations Part L (conservation of fuel and power) is expected later this year and due to be adopted in 2022. The proposed update would include an uplift

to the energy efficiency standards and requirements, 'tightening' the current building standards. It aims to reduce the energy demand of buildings through higher standards of building fabric and insulation. This would reduce the GHG emissions associated with heating and cooling of buildings.

- 15.5.12 Sources of GHG emissions would include emissions associated with transport. By 2032, it is anticipated that emissions from the transport sector will have declined, (DBEIS, 2020). In 2018, 97% of final energy consumption in transport was from fossil fuels, however by 2035 this is projected to fall to 93% due to the update of EVs and increased use of biofuels.
- 15.5.13 In 2018, the UK Government launched the Road to Zero strategy, which sets out its ambition to reduce emissions from vehicles on UK roads and promote the uptake of zero emissions vehicles (DfT, 2018). Proposed support mechanisms to facilitate this transition include increasing the supply and sustainability of low carbon fuels in the UK through a legally-binding 15-year strategy, offering grants for plug-in vehicles and introduce a voluntary industry-supported commitment to reduce Heavy Goods Vehicles GHG emissions by 15% by 2025, from 2015 levels.
- 15.5.14 In March 2020, the Electric Vehicles and Infrastructure paper was published, which outlined how the infrastructure for EVs have been planned for and what incentives are available to encourage growth. In November 2020, the UK Government announced that the sale of new petrol and diesel cars will be stopped in the UK by 2030 (DfT, 2020). The two phased processed will see the phase out date for the sale of new petrol and diesel cars and vans be brought forward to 2030, and all new cars and vans to be fully zero emissions at the tailpipe from 2035. This target is also supported by DfT's Transport Decarbonisation Plan (July 2021), as set out in [Appendix 15.1](#). Significant investment has been allocated to support the greater uptake of zero emission vehicles, including £1.8 billion to build more chargepoints, as well as £582 million in grants.
- 15.5.15 The Proposed Development would also generate emissions associated with purchased electricity from the National Grid during operation of the development, for example for lighting. The National Grid is currently decarbonising, which is anticipated to continue over the next decade. This is an outcome of the continued uptake of renewable energies and the decline of coal-fired power stations across the UK. The increasing share of low carbon, renewable energy sources with a corresponding decrease in the use of fossil fuels, is termed "decarbonisation". This change is significant as it encourages the use of grid-supplied electricity systems, such as air source heat pumps, over gas-fired plant. Furthermore, technologies generating on-site electricity (such as gas-engine combined heat and power (CHP)) will not achieve the carbon savings they have to date (because they are offsetting less 'carbon' as the grid decarbonises). Therefore, the emissions per unit of electricity generated (grams of carbon dioxide per kilowatt hour) is reducing. The Governments policy paper 'Transitioning to a net zero energy system: smart systems and flexibility plan' (July 2021), see [Appendix 15.1](#), further supports the decarbonisation of energy across the UK. As a result, GHG emissions within HEP from elements dependant on grid energy, including EV charging, will reduce.
- 15.5.16 Under the 2017 Planning Consent there is a series of proposed habitat retention, losses, creation and enhancement to habitats within the Site, which is anticipated to be managed through habitat management strategies. The discrete blocks of plantation woodland present throughout the Site is considered to be retained as part of the 2032 Baseline, which will continue to mature and sequester carbon. Amendments to the landscaping plan relating to the 2017 Planning Consent including new areas of woodland will not be in a mature condition as part of the 2032 Baseline. Outside of the woodland, orchard and hedgerow treelines, there are relatively few mature trees within the Site. New tree planting is proposed together with a tree nursery so that there is a pipeline of specimens to plant and renew the tree population on Site and support tree planting off the main Site including on the Gravity Link Road. The Gravity tree nursery can be used to accelerate tree planting across a wider area.

15.6 Embedded Mitigation

Construction

- 15.6.1 During construction, a Framework Demolition and Construction Environmental Management Plan (FDCEMP) will be prepared prior to the commencement of construction works at the Site. The FDCEMP will include mitigation measures covering transport, materials, waste and air quality during construction. Measures that will reduce GHG emissions during construction include, for example, no unnecessary idling of engines, maintenance of plant equipment to check they are operating optimally and efficient use of materials to reduce waste. This is secured through the Compliance Form.
- 15.6.2 Additionally, a Site Waste Management Plan (SWMP) will be implemented to manage waste during construction. The SWMP aims to ensure that the waste produced during the construction phase and other phases of the Proposed Development are dealt with in accordance with the duty of care provisions in the Environmental Protection Act (1990). The adoption of the principles of the waste management hierarchy will be implemented throughout. This will help to reduce GHG emissions associated with waste management. This is secured through the Compliance Form.

Operation

Transport

- 15.6.3 As outlined in Chapter 9 Transport and Access, the general approach to access and movement through the Proposed Development focuses on the following themes:
- Reducing the need to travel;
 - Reducing travel distances;
 - Improving access and choice for pedestrian movement;
 - Improving access and choice for cycle movement;
 - Introducing new and innovative micromobility measures;
 - Improving local bus / public transport connectivity.
- 15.6.4 A Framework Travel Plan ([Appendix 9.2](#)) has been prepared which sets out modal share targets, measures to encourage travel by sustainable modes of transport, and a robust monitoring and review programme.

Energy

- 15.6.5 The Design Guide sets out the ambitions to deliver a smart campus that supports clean and inclusive growth sectors and identifies a clear need to provide this with consideration of climate change. This is supported by an Energy Strategy (Stantec, 2021) which sets out key targets for delivering clean energy. As stated in the Energy Strategy, the residential dwellings on Site will have 100% electric-led heating and hot water. As described in [Section 15.5.13](#) above, as the National Grid continues to decarbonise, the grams of carbon per kilowatt hour for electricity will decrease, and therefore associated carbon emissions with grid electricity will continue to reduce over time.
- 15.6.6 Gravity will adopt the nationally and locally recognised energy hierarchy of reducing energy demand in the first instance, using energy efficiently and, only then, providing renewable and low carbon energy generation technologies where it is appropriate to do so. The Energy Strategy sets out a series of design principles to reduce energy demand, such as orienting

buildings where possible to take advantage of south-facing aspects for winter passive solar gains, as well as 'passive' and 'active' building design principles to reduce energy demand of buildings.

Retention and Creation of Habitats, Green Infrastructure and Open Space

- 15.6.7 The Strategic Landscape parameter plan outlines the proposals for the incorporation of green infrastructure and natural open space, retention of existing meadow grasslands and proposed new woodland planting. The Strategic Landscape Parameter Plan shows a green, landscaped edge in the south east corner of the Site, in the south west corner of the Site and on the Western boundary of the site. Additionally, a landscaped green edge will be provided along Woolavington road and an east-west landscape corridor south of the HEP which will incorporate street trees and rhynes. Additional landscape works are proposed in the North east of the site.
- 15.6.8 The incorporation of green infrastructure and natural open space will provide evaporative cooling at night and help to reduce the heat island effect. The permeability of green spaces throughout the Proposed Development will help to facilitate air movement, enhance natural ventilation and will help provide shading and local cooling of the microclimate. This will assist in passively reducing the energy demands, and therefore the GHG emissions, of the Proposed Development.

15.7 Assessment of Likely Effects

Construction

Scope 1

- 15.7.1 The main sources of direct GHG emissions during construction relate to the combustion of fossil fuels during the transportation of building materials and waste by Heavy Goods Vehicles (HGV) to and from the Site, as well as powering construction plant engines and equipment. The implementation of the FDCEMP will help to manage and reduce GHG emissions associated with construction vehicles, plant and equipment. The direct GHG emissions from construction activities is considered to have a regional scale of impact given the size of the site and the carbon intensive nature of construction without intervention and based on current emission standards. This is Moderate Adverse impact at a regional level and therefore is of **Moderate Significance** without the implementation of further mitigation.
- 15.7.2 The enabling activities and land clearance activities required for the construction of the Proposed Development will result in direct GHG emissions released from movement and disturbance of soil on Site. However, as the majority of the Site has been remediated under the 2017 Planning Consent, it is considered that the existing ground conditions are already well disturbed, and this is likely to affect only the greenfield elements of the Site (approximately 11 ha). This will result in a local scale and Small Adverse impact and therefore is of **Minor Significance**.

Scope 2

- 15.7.3 The temporary construction office, welfare facilities, temporary residential accommodation for construction workers and temporary lighting on the Site will require electricity purchased from the National Grid. This will result in indirect GHG emissions generated from the burning of fossil fuels to deliver electricity to the National Grid. Construction for Gravity is anticipated to come forward as the National Grid continues to decarbonise. Additionally, the implementation of a FDCEMP will help to manage and control the use of electricity on Site. The indirect GHG emissions from construction activities is considered to have a regional scale and Moderate Adverse impact and therefore is of **Moderate Significance** without the implementation of further mitigation.

Operation

Scope 1

- 15.7.4 The Proposed Development will generate an increase in traffic volumes through the Site and along the local transport network thereby generating GHG emissions from burning fossil fuels through road transport. Traffic associated with the residential land uses will generate a limited number of HGVs, however there may be a higher number of HGV movements associated with the commercial and energy distribution land uses. **Section 9.7** of the Transport Chapter outlines the anticipated changes to traffic flows as a result of Gravity against the 2032 Baseline. No road link shows an increase of traffic movements above 13%. It is noted that some links are anticipated to experience reduced traffic movements, however this may be as a result of redistribution across the road network rather than a reduction of trips. The direct emissions from operational transport are anticipated to have a regional scale and Moderate Adverse impact and therefore is of **Moderate Significance** without the implementation of further mitigation.
- 15.7.5 The woodland areas on the Site currently act as land carbon sinks which naturally sequesters and stores carbon. The Strategic Landscape parameter plan shows indicative areas of structural and woodland planting. It is typical for planting to take approximately 15 years to mature and, once established, these new woodland areas will also sequester and store carbon. Therefore, the direct GHG emissions from land use change is a Small Beneficial impact at a local level and therefore of **Minor Beneficial Significance**.

Scope 2

- 15.7.6 GHG emissions will be produced as electricity from the National Grid is purchased for electric heating, powering appliances and maintaining lighting on the proposed road network. However, as noted above, the amount of GHG's anticipated to be released as a result of generating electricity for the National Grid is anticipated to decrease over the next 10 years as a direct result of the rapid decarbonisation. The decarbonisation of the Grid will reduce the amount of GHGs emitted by the operational energy uses of the Site over time, however until the National Grid is net zero, the indirect emissions from purchased electricity within the Proposed Development is considered to have a regional scale and Moderate Adverse impact and therefore is of **Moderate Significance** without the implementation of further mitigation.

15.8 Further Mitigation

- 15.8.1 The below further mitigation alongside the embedded mitigation outlined above **section 15.6**, is in line with local policy, including Policy S5 of SDCs Local Plan which requires new development to contribute to the following objectives:
- Minimising of natural resources by the use of sustainably sourced materials: **Paragraph 15.8.3**;
 - Reuse and recycling of materials where appropriate: **Paragraph 15.6.2**;
 - Minimising of greenhouse gas emissions: all mitigation referenced in **sections 15.6 and 15.8**;
 - Incorporating energy efficiency: **Paragraph 15.8.4**;
 - Reducing waste **Paragraph 15.6.2**;
 - Encouraging modes of transport other than the car: **Paragraphs 15.6.3 and 15.8.8**; and

- Utilising renewable and low carbon energy (including decentralised energy) where appropriate, taking into account the need to safeguard amenity, the natural, built and historic environment, and landscape: **Paragraphs 15.8.7, 15.6.6-7 and 15.8.10.**

Construction

- 15.8.2 Construction Traffic Management Plans (CTMP) will be prepared for the construction phase, which will set out the routing plans for working and deliveries, scheduling and timing of deliveries, and logistics plans. This will help to improve the efficiencies of vehicle movements during operation and in turn, reduce GHG emissions associated with construction traffic. The Framework Demolition and Construction Environmental Management Plan (FDCEMP) identifies mitigation measures that limit potential impacts from construction traffic. This will also consider vehicle type, fuel and emissions and include the opportunity for trials and test beds to explore new methodologies and practice. This is secured through the Compliance Form.
- 15.8.3 The LDO will require occupiers to develop their own Environmental and Social Governance (ESG) policies and prepare an annual ESG report on progress. This is secured through the Compliance Form (and is an obligation within the S106). This will include measures on sustainable procurement and the responsible sourcing of materials. Utilising recycled materials, where possible, is the most sustainable approach, with the consideration of using materials that go through less energy-intensive processes and that can be sourced locally. There are a number of UK organisations promoting the review and reduction of embodied carbon and supply chain emissions associated with construction as part of their sustainability initiatives. These include WRAP, the UK Green Building Council and the Green Construction Board. The Site Waste Management Plan, (**Appendix 3.3**) includes measures on material procurement and the use of material suppliers with environmental standards where possible. These measures will help to reduce embodied carbon.

Operation

Energy Efficiency

- 15.8.4 The energy efficiency requirements of the Building Regulations are set out in Part L of Schedule 1, as well as in a number of specific building regulations. Approved Documents L1A and L2A set out the requirements for conservation of fuel and power in dwellings and non-domestic buildings, respectively.
- 15.8.5 An update to Approved Document Part L1A is planned to be released in 2021, which is expected to have significant implications for energy strategies for new developments. The proposed update would include an uplift to the energy efficiency standards and requirements, 'tightening' the current building standards. It aims to reduce the energy demand of buildings through higher standards of building fabric and insulation. This would reduce the GHG emissions associated with heating and cooling of buildings.
- 15.8.6 As outlined in the Energy Strategy (Stantec, 2021), a Future Homes Standard will be coming forward and introduced by 2025. As a result of the uplifts in energy efficiency standards, it is anticipated that homes at the Proposed Development will be built out to a high level of energy efficiency, thereby reducing the GHG emitted associated with heating and cooling of buildings.

Renewable Technologies

- 15.8.7 The Energy Strategy (Stantec, 2021) for the Proposed Development has identified a number of opportunities for incorporating renewable and low carbon energy generation technologies. The most suitable technologies are anticipated to be photovoltaic solar panels (PV), battery storage, heat recovery technology, solar water heating systems (or solar thermal) and heat

pumps. These technologies would reduce the GHG emissions associated with energy use during the operation of the Proposed Development.

- 15.8.8 It is noted that EON has signed a 50-year agreement with This is Gravity Ltd. to provide renewable and low carbon energy solutions for the Site. This is Gravity Ltd. is also seeking agreement with National Grid to secure renewable energy through the grid system using Purchase Power Agreements (PPAs) and Renewable Energy Guarantees Origin (REGOs). This agreement will be completed once occupiers for the Site are confirmed.

Transport

- 15.8.9 Opportunities will be sought to integrate EV charging across the Site, as well a Car Club to reduce the need to own a car. These measures will help to reduce GHG emissions resulting from transport.
- 15.8.10 Whilst it is not mitigation, as noted in the 2032 Baseline section, emissions from transport are predicted to decline in the coming decades. The uptake of EVs and hydrogen is anticipated to increase in line with Government policies, as petrol and diesel car sales will be banned by 2030. It is projected that the proportion of mileage driven by EVs for example is anticipated to almost double from 7.5% in 2030 to 14.1% in 2035 (add ref). An increase in EV uptake will result in a reduction in transport emissions associated with the Proposed Development in the long term, as vehicles will be powered by lower (or zero) emitting electricity sources.

Landscape and Ecology

- 15.8.11 As outlined in Chapter 12 Biodiversity, an Ecological Mitigation and Enhancement Strategy (EMES), which is secured within the Compliance Form, will be prepared for the Site that secured by way of the design code and mitigation checklist. This report will include consideration of the maintenance / management measures associated with onsite ecological networks and features that are to be retained, enhanced and created within the Proposed Development. This will help to ensure maturation of existing retained and proposed woodland planting which will continue to sequester carbon on site.

Future Occupation of the Site

- 15.8.12 The Proposed Development is framed to attract large scale advanced manufacturing facilities to the UK to accelerate progress towards achieving a net zero carbon economy, hosting new business to support transport decarbonisation and the shift to electrification. Supporting green industries could result in wider carbon reductions beyond the Site GHG emissions.

15.9 Residual Effects

Construction

- 15.9.1 The assessment identified a moderate adverse significant resulting from Scope 1 GHG emissions from the combustion of fossil fuels on Site during construction activities. It is anticipated that, with the implementation of the further mitigation which includes ESG policies on, for example, sustainable procurement and the use of renewable energy in construction as identified in **Section 15.8**, this will be reduced to a **Minor Adverse Significant** effect on the local context of emissions, in keeping with IEMA guidance.
- 15.9.2 Minor adverse effects from Scope 1 GHG emissions from land clearance and enabling activities were identified. There are no further mitigation measures identified and therefore the effect remains **Minor Adverse Significant** effect on the local context of emissions, in keeping with IEMA guidance.

- 15.9.3 Moderate adverse effects from Scope 2 use of electricity from the National Grid were also identified in the assessment. Through the use of electric and hydrogen led construction techniques adopting decarbonised grid electricity and local renewable generation, the context of the emissions would reduce to local and therefore **Minor Adverse Significant** effect on the local context of emissions, in keeping with IEMA guidance.
- 15.9.4 The Proposed Development considers several mitigation measures to reduce these emissions through responsible and sustainable construction practices. Embedded and further mitigation for the Proposed Development is in line with local policy requirements and it is therefore considered that, while residual effects remain, the Proposed Development addresses GHG emissions during construction.

Operation

- 15.9.5 The assessment identified a moderate adverse effect resulting from Scope 1 GHG emissions during the operation stage as a result of transport emissions. It is anticipated that, with the implementation of the further mitigation on electric and hydrogen movement, identified in **Section 15.8**, this will be reduced to a local impact therefore consider a **Minor Adverse Significant** effect on the local context of emissions, in keeping with IEMA guidance.
- 15.9.6 A Minor Beneficial effect has been identified in relation to carbon sequestration from the proposed planting within the Site. While further mitigation will help to see the longer term success of the planting, the effect is considered to remain as **Minor Beneficial** and **Significant** on a local scale.
- 15.9.7 Moderate adverse effects were also identified from Scope 2 use of electricity from the National Grid. With the incorporation of energy efficiency measures, electric heating led energy use and renewable energy provision, this will reduce to a **Minor Adverse Significant** effect on the local context of emissions, in keeping with IEMA guidance.
- 15.9.8 With the national decarbonisation of the grid and the potential for agreement of securing REGOs or directly connected renewable energy with smart grid infrastructure with future occupiers of the Site, there is the potential for this effect to become Negligible and Not Significant.
- 15.9.9 Several mitigation measures are embedded into the design of the Proposed Development and further mitigation has also been identified to be secured through the design guide and mitigation checklist. It is also acknowledged that the Proposed Development is an enabler of low carbon industries which could result in wider carbon reductions beyond the Site GHG emissions. The mitigation for the Proposed Development is in line with local policy and it is therefore considered that the Proposed Development addresses GHG emissions during the operation stage.
- 15.9.10 GHG emissions are also expected to reduce over time due to several Government policies and strategies, including the national decarbonisation of the Grid, the transition to greener industrial uses and the increased use of EVs over petrol or diesel vehicles. In the context of Government policy, it is considered that GHGs resulting from the Proposed Development will be **Not Significant** on a national scale.

15.10 Monitoring

- 15.10.1 GHG emissions during construction and operation are considered to be significant on a local scale. Construction activities, including transport, energy consumption and plant emissions will be monitored and managed through the FDCMP. It is not considered proportionate to monitor the operational GHG emissions of the Proposed Development given that there are several sources of emissions, many of which that are out of the control of the Applicant as the occupiers are not yet known.

- 15.10.2 However, the travel patterns of future occupiers of the Proposed Development will be monitored through travel surveys, as identified in the Framework Travel . Energy use will be regulated as each plot comes forward in more detail, detailing how the energy commitments have been met through the design for each Phase, and development control will certify the Proposed Development to be delivered in accordance with the regulatory requirements. Monitoring of the existing retained and proposed planting will be undertaken as part of the EMES.

Part 2: Climate Change Risk Assessment

15.11 Introduction

- 15.11.1 This section presents the assessment of likely significant effects of climate change upon the Proposed Development. Assessing climate change resilience and adaptation aims to determine the vulnerability of key environmental receptors to climate change, the likely significant effects climate change would have on these receptors and outline the mitigation measures that the Proposed Development takes to adapt to the projected climate change effects. The Climate Change Risk Assessment (CCRA) is presented in **Table 15.11**.

15.12 Policy, Legislation, Guidance and Standards

National Policy and Legislation

- 15.12.1 The following legislation has informed the assessment of effects within this section. Further details are provided in **Appendix 15.1**

- Town and County Planning (Environmental Impact Assessment) Regulations 2017 (as amended)
- National Planning Policy Framework (NPPF) 2021
- Planning Practice Guidance (PPG) 2019

Local Policy

- 15.12.2 In 2020, SDC released a Climate Emergency Strategy and Action Plan, which sets out six areas of focus and a series of actions to reduce address the climate and ecological crisis. The six areas are travel, waste, energy & buildings, business & economy, food & agriculture and nature. The Action Plan sets out key climate resilience measures within Sedgemoor, including preparing for extreme weather events, and increasing tree cover within the district.
- 15.12.3 A summary of the relevant planning policy within the Sedgemoor Local Plan 2011-2032 is provided below:
- Policy S4 Sustainable Development Principles requires development proposals to contribute to *“Mitigating the causes of climate change and adapting to those impacts that are unavoidable”*, and *“Providing a wider choice of housing to meet the needs of local people with improved house type designs that respond to climate change and population change”*;
 - Policy S5 Mitigating the Causes and Adapting to the Effects of Climate Change requires development to adapt to the effects of climate change by:
 - *“Minimising and where possible reducing the risk of flooding, including avoiding inappropriate development in flood risk areas. Where development is necessary ensuring development is safe over its lifetime without increasing flood risk elsewhere and ensuring appropriate management of land within areas vulnerable to flooding;*
 - *Maximising resilience to climate change through design, layout and construction;*
 - *Providing additional measures through natural shade and cooling in the built environment and the provision of networks of green infrastructure and tree planting to compensate for CO2 emissions;*

- *Ensuring that the ability of landscapes, habitats and species to adapt to the adverse effects of climate change is not affected with compensatory habitats provided;*
- *Water efficiency and other measures to improve drought-resilience, maintain water flows and quality, including the use of sustainable drainage systems;*
- *Protecting soils to ensure they are resilient to the effects of climate change;*
- *Providing increased opportunities to walk or cycle;*
- *Supporting opportunities for local food production and farming.”*
- Policy D2 Promoting High Quality and Inclusive Design requires development to demonstrate *“High quality sustainable and inclusive design that responds positively to and reflects the particular local characteristics of the site and the identity of the surrounding area as well as taking into account climate change”* and *“That consideration has been given through the design process to climate change mitigation and adaptation, including good design of layout, aspect, massing and use of materials in order to reduce energy consumption and thereby minimise contributions to climate change”*.

Puriton Energy Park Supplementary Planning Document (SPD) 2012

- 15.12.4 The Puriton Energy Park SPD, adopted March 2012, sets out how the allocation for an Energy Park on the site of the former Royal Ordnance Factory should be developed. The SPD identifies relevant policies for the Energy Park, including those regarding climate change, and highlights the need to consider climate change within a range of topics including green infrastructure provision, flood risk, and community, recreation and leisure facilities.

Bridgwater Vision 2015

- 15.12.5 The Bridgwater Vision, updated and published in December 2015, provides a framework for the planned growth of Bridgwater and states within one of the 15 primary objectives for Bridgwater is *“To create an urban design framework using creative development concepts that are innovative in their response to climate change, sustainable development, retail, residential and commercial opportunities.”*
- 15.12.6 The document referencing the National Guidance on Adaptation to Climate Change and the headline issues for climate change include *“increased risk of high temperatures in summer, flooding in winter, extreme weather events, subsidence due to ground conditions variability and general baseline warming which affects design benchmarking”*.
- 15.12.7 The document notes that *“Further integration of energy generation, green infrastructure, air quality improvements, sustainable transport and flood prevention measures into growth and development will ensure that Bridgwater is resilient and able to adapt to climate and economic change.”* A key priority for the area going forward is the need for *“resilience planning and infrastructure to protect the district from the effects of climate change”*.

Guidance

- 15.12.8 Several standards and guidance documents have been used to inform this chapter. Full details of how the following documents have been considered in climate change resilience and adaptation is provided in **Appendix 15.1**:
- EIA Guidance on Climate Change Resilience & Adaptation (IEMA, 2020)
 - UKCP18 Guidance: How to use the UKCP18 Land Projections (Met Office, 2018)

- UK Climate Change Risk Assessment 2021 (CCC, 2021);
- The National Adaptation Programme (Defra, 2018).

15.13 Consultation

15.13.1 SDC provided its EIA Scoping Opinion for Gravity in September 2021, and stated that:

“In relation to climate adaptation and resilience we support the use of latest UKCP18 projections and note the conservative use of the high emission RCP8.5 scenario (i.e. business as usual) when assessing the vulnerability and resilience of the proposed development. In line with IEMA guidance it should be considered whether any further sensitivity testing is appropriate taking into account the vulnerability of receptors. If following an assessment of susceptibility/vulnerability of receptors further sensitivity testing is not considered appropriate, we would recommend this is explained/justified as part of the Environmental Statement. In relation to receptors to assess we would agree with the technical note that these can be grouped into three broad categories – Building and Infrastructure, Human health / future users, and environmental receptors (e.g. habitats, species, landscaping and planting).”

15.13.2 In response to the above, defining receptor sensitivity has been undertaken and is described in **Table 15.8** below.

15.14 Methodology

Study Area

15.14.1 The CCRA uses the UK Climate Change Projections 2018 (UKCP18) provided by the UK Met Office (Met Office, N.Da) for the 25 km grid cell within which the Site is located (SP 337500, 137500), although the area of influence for potential climate vulnerability impacts is expected to be limited to the Site and the immediate area around this.

Baseline Data Collection

15.14.2 The following data sources were reviewed to establish the baseline conditions:

- Met Office historic climate data – to identify the historic trends of relevant climatic factors for the geographic area of the Scheme.
- UKCP18 – to identify the climate projections for the geographic area, including the 2032 baseline, and appropriate temporal scope of the Proposed Development.

15.14.3 In addition, a review was undertaken of the following chapters within this ES, which directly feed into the CCRA:

- Chapter 8: Health, Wellbeing and Social Impacts
- Chapter 9: Transport and Access
- Chapter 12: Biodiversity
- Chapter 13: Water Environment
- Chapter 14: Landscape and Visual

UKCP18

- 15.14.4 The UK Climate Projections (UKCP18) produced by the UK Met Office (Met Office, 2018) is the main source of information for the 2032 Baseline and future baseline. UKCP18 uses observations of weather and climate combined with climate models to create a range of climate projections for different emissions scenarios. UKCP18 builds upon previous projections to provide information on how the climate of the UK may change over the rest of this century, describing how climatic conditions, long term seasonal averages and extreme weather conditions may change over future decades. The baseline data is complemented a literature review of relevant publications for variables for which UKCP18 does not provide information (for example, wind direction).
- 15.14.5 UKCP18 uses Representative Concentration Pathways (RCPs) to develop projections and consider factors such as economic activity, population growth and land use change, which will result in a different range of global mean temperature increases until 2099. RCP8.5 is the most conservative, highest-impact scenario. The scenario reflects an average increase in global mean surface temperature compared to the pre-industrial period of 4.3°C by 2081-2099. IEMA guidance (2020) generally recommends that the high emission scenario, RCP8.5, is used for climate change risk assessments. As set out in the Climate Change Act (2008), the UK Government has committed to reaching net zero emissions by 2050, with legally binding carbon budgets.
- 15.14.6 This is also considered the most appropriate scenario for assessing the impact of climate change on the Proposed Development based on policy and legislation for the UK to achieve net zero carbon by 2050, which is in line with limiting global temperature increases to 1.5°C, and professional judgement.
- 15.14.7 IEMA guidance recommends that the climatic baseline should consider extremes in short-term weather events, such as heatwaves; long-term climatic variability, such as seasonal changes in precipitation; and average climate norms, such as ambient temperature.
- 15.14.8 A review of the following data from this projection has been undertaken:
- Average Summer Precipitation (% change);
 - Average Winter Precipitation (% change);
 - Average Annual Precipitation (% change);
 - Maximum Average Summer Temperature;
 - Minimum Average Winter Temperature; and
 - Annual Mean Temperature.
- 15.14.9 The projections (**Appendix 15.2** and **15.3**) show the potential change in temperature or precipitation above or below the observed temperature/precipitation for 1981-2000.
- 15.14.10 The CCRA considers the assessment year (2032) as well as 25-year intervals up to 2099, as this is the last date available in the UKCP18 data.

Assessment Methodology

- 15.14.11 In accordance with IEMA guidance, the vulnerability and resilience of the Proposed Development to climate change has been identified by undertaking a risk assessment that includes:
- *“Identifying potential climate change risks to a scheme or project;*

- *Assessing these risks (potentially prioritising to identify the most severe); and*
- *Formulating mitigation actions to reduce the impact of the identified risks.” (IEMA, 2020)*

15.14.12 The risk assessment considers the likelihood of a hazard occurring that could result in an impact on sensitive receptors. In addition, the magnitude of effects on the Proposed Development will depend on the severity of the consequence of the impact, and the vulnerability of the receptor itself. The definitions of these terms can therefore be summarised as follows (IEMA 2020):

- **Hazard** is an effect of climate change which has the potential to cause an impact on sensitive receptors associated with the Proposed Development;
- **Magnitude** is the likelihood of impact occurring and the consequence of the impact of a hazard; and
- **Vulnerability** is the degree to which receptors are susceptible to adverse impacts and is influenced by sensitivity, adaptive capacity, and exposure to climate hazards.

Identification of Receptors

15.14.13 Receptors that may be affected by climate change have been identified with consideration of both extreme weather events and gradual climatic changes in the study area for the Proposed Development. In accordance with IEMA guidance, the sensitivity of receptors to climate change effects during operation is described in **Table 15.7**. In ascribing the sensitivity of receptors in relation to potential climate change effects, the susceptibility of the receptor (e.g. ability to be affected by a change) and the vulnerability of the receptor (e.g. potential exposure to a change) must be taken into account. These are defined in IEMA (2020) guidance as follows:

“The susceptibility of the receptor can be determined using the following scale:

- *High susceptibility = receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevaling climatic factors (e.g. lose much of its original function and form).*
- *Moderate susceptibility = receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevaling climatic conditions (e.g. retain elements of its original function and form).*
- *Low susceptibility = receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevaling climatic factors (e.g. retain much of its original function and form).*

The vulnerability of a receptor can be defined using the following scale:

- *High vulnerability = receptor is directly dependent on existing/prevaling climatic factors and reliant on these specific existing climate conditions continuing in future (e.g. river flows and groundwater level) or only able to tolerate a very limited variation in climate conditions.*
- *Moderate vulnerability = receptor is dependent on some climatic factors but able to tolerate a range of conditions (e.g. a species which has a wide geographic range across the entire UK but is not found in southern Spain).*

Low vulnerability = climatic factors have little influence on the receptors.”

Receptor	Sensitivity	Reasoning
Future users of the site (residents, employees, students)	Moderate to High	Some future users of the Site will be more susceptible to climate change than others, depending on a range of factors such as age (children, young people and the elderly) and existing poor health.
Infrastructure including buildings and roads	Moderate	Infrastructure across the Proposed Development ranges in value. Critical infrastructure, such as energy and water pipes/cables are considered to be of moderate susceptibility given that it can tolerate some changes in climate but is critical for the operation of the Proposed Development.
Ecology, Landscaping and Planting	Moderate	The habitats that have been identified onsite are representative of typical lowland landscapes including woodlands, hedgerows, grasslands and elements of wetland (see Chapter 12 for details) are not considered to be of high vulnerability to the broad effects of climate change such as changes in average temperatures or changes to the hydrology, however some habitat such as reed beds, rhynes and wet grasslands may be more sensitive to changes in summer rainfall and droughts. The compliment of protected / notable species recorded within the Site are not considered to be significantly sensitive to the effects of climate change in terms of their current distribution or climactic tolerances, and the majority of species recorded are widespread regionally, nationally or internationally (e.g. northern and central Europe).

Table 15.8 Receptor Sensitivity

15.14.14 During the construction phase, it is anticipated that the risk of climate hazards (e.g. heatwaves or periods of heavy precipitation) may increase, however it is expected that these will be managed through standard construction and health and safety practices, such as securing material/equipment and not undertaking works during periods of extreme rainfall. Therefore, the vulnerability of the Proposed Development to climate change during construction has been scoped out of the assessment for the ES.

Assessment of Significance

15.14.15 There is an absence of significance criteria for determining the significance of effects resulting from climate change. IEMA guidance states that receptor vulnerability and uncertainties must be considered. Significance has therefore been determined by IEMA guidance and professional judgement.

Limitations

15.14.16 Scientific evidence shows that our climate is changing. However, there are significant uncertainties in the magnitude, frequency and spatial occurrence within the climate projections utilised in this assessment. The projections are dependent on future global GHG emissions and, while several different scenarios are provided, it cannot be reliably predicted which (if any) emission scenario will occur over the next 80 years (Fung et al., 2018).

15.14.17 Additionally, projections after the 2040s increasingly diverge between scenarios and provide greater confidence for long-term climate averages than extreme events. For example, there is greater confidence around changes in temperature than there is in relation to wind. Levels of confidence and certainty are considered when assessing the likelihood and consequence of climate hazards.

15.15 Baseline Conditions

Current State of the Environment

UK Observations

15.15.1 Observed climate changes over the UK include:

The most recent decade (2009-2018) has been on average 0.3 °C warmer than the 1981-2010 average and 0.9 °C warmer than 1961-1990. All of the top ten warmest years have occurred since 2002 (Lowe *et al.*, 2019);

- In the past few decades there has been an increase in annual average rainfall over the UK. However, natural variations are also seen in the longer observational record (Lowe *et al.*, 2019);
- The period since 2000 accounts for two-thirds of hot-day records, and close to half of wet-day records, in monthly, seasonal, and annual observations since 1910 (Kendon, 2014);
- The frequency of severe autumn and winter wind storms increased between 1950 and 2003 (Alexander *et al.*, 2005), although storminess in recent decades is not unusual in the context of longer European records dating back to the early 20th century (Metulla *et al.*, 2008); and
- Widespread and substantial snow events have occurred in 2018, 2013, 2010 and 2009, but their number and severity have generally declined since the 1960s (Met Office, N.Db).

Regional Observations

15.15.2 Historic climate averages during the period 1981-2010 for the closest climate station to the site (Cannington), obtained from the Met Office website (Met office, N.Dc), indicates the following:

- Average annual maximum temperature was 14.7°C;
- Warmest month on average was July (mean maximum temperatures of 21.6°C);
- Coldest month on average was January (mean minimum temperature of 8.5°C);
- Average total annual rainfall was 755 mm;
- Wettest month on average was October (average monthly rainfall of 83.9 mm); and
- Driest month on average was April (average monthly rainfall of 51.1 mm).

15.15.3 Chapter 13 Water Environment sets out the existing conditions with regards to flood risk. The majority of the Site is designated as Flood Zone 3, although it should be noted that this is identified as tidal and not fluvial, and does not take into account of any existing defences which the Site is indicated to benefit from, and it is considered that the Site is not known to have flooded since its development as a ROF. Areas of Flood Zone 2 are indicated towards the southern part of the Site, also indicated to be tidally rather than fluvial influenced. Further south and at higher elevation, the remaining land within the Site is indicated to lie within Flood Zone 1. This is defined as land having a less than 1 in 1,000 annual probability of tidal flooding. The Study Area is predominantly within an area at very low risk of surface water flooding. Groundwater and reservoir flooding are not considered to be significant source of flood risk.

2032 Baseline

- 15.15.4 **Table 15.9** below provides a summary of the projected climatic changes for the Site for 2032, with data from 2021 provided for context. This is based on the UK Climate Projections 2018 (UKCP18) produced by the UK Met Office (Met Office, 2018).

Date	Mean air temperature anomaly* at 1.5 m (°C)	Annual Precipitation rate anomaly (%)	Maximum Summer air temperature anomaly at 1.5 m (°C)	Average Summer Precipitation rate anomaly (%)	Minimum Winter air temperature anomaly at 1.5 m (°C)	Average Winter Precipitation rate anomaly (%)
2021	0.73	-1.09	1.04	-13.91	0.66	10.91
2032	1.05	-3.54	1.82	-20.47	1.06	7.18

*Anomaly refers to the change compared to the baseline. The projections are not absolute values.

Table 15.9 50th Percentile Climate Projections in 2021 for context, and 2032 for 25 km grid square 337500, 137500 using baseline 1981-2000 scenario RCP8.5

- 15.15.5 The projections show that the Site is likely to experience an increase in annual average temperature and a decrease in annual rainfall. By 2032, the Site is expected to experience warmer, drier summers and milder, wetter winters.
- 15.15.6 As outlined in Chapter 13 Water Environment, it is anticipated that, as flood risk is predominantly tidally influenced, the likely impact sea level rise will have on the Site for the 2032 baseline scenario is estimated to be minimal. As the 2017 Planning Consent required implementation of a Surface Water Management Strategy to serve the development and manage rainfall on site, it is assumed that surface water flood risk on site for the 2032 baseline scenario will be very low. Risk from groundwater and reservoir flooding also remains unchanged from the current state of the environment.
- 15.15.7 In addition, under the 2017 Planning Consent there is a series of proposed habitat retention, losses, creation and enhancement to habitats within the Site, which is anticipated to be managed through habitat management strategies.

Future Baseline

- 15.15.8 This section presents the future climate simulations extracted from UKCP18 up to 2099. **Figures 15.2.1 – 15.2.6** in **Appendix 15.2** show the grid square projections for average summer, winter and annual precipitation, maximum average summer temperature, minimum average winter temperature and annual mean temperature. A summary of the projections is provided below. This is supported by data extracted from the probabilistic projections which is presented in **Appendix 15.3**, a summary of which is provided in **Table 15.10** below.

Date	Climate Variable at 50th Percentile					
	Mean air temperature anomaly at 1.5 m (°C)	Annual Precipitation rate anomaly (%)	Maximum Summer air temperature anomaly at 1.5 m (°C)	Average Summer Precipitation rate anomaly (%)	Minimum Winter air temperature anomaly at 1.5 m (°C)	Average Winter Precipitation rate anomaly (%)
2040	1.2700	1.2525	1.7205	-19.4792	1.2990	8.5645
2050	1.7252	0.8204	2.7148	-25.1392	1.6075	8.5184
2075	3.0804	1.9082	4.9348	-35.0712	2.7810	22.6013
2099	4.9084	-5.5775	7.9854	-48.6258	4.1581	23.3458

Table 15.10 50th Percentile Climate Projections at 25 km grid square 337500, 137500 using baseline 1981-2000 scenario RCP 8.5

15.15.9 The projections show an almost continuous increase in annual average temperature over the next 80 years (**Figure 15.1** in **Appendix 15.2**). Annual precipitation is shown to vary year on year, with some years being dryer or wetter than previous years (**Figure 15.2** in **Appendix 15.2**).

15.15.10 The projections suggest that summers will become warmer and drier, with an expected increase in maximum summer temperatures and overall decline in summer precipitation (**Figures 15.3 and 15.4** in **Appendix 15.2**). Natural variations may mean that some cooler and/or wet summers will occur.

15.15.11 Winters may become milder and wetter, with an overall increase in both minimum winter temperature and winter precipitation. Natural variations may mean that some cold and/or dry winters may still occur (**Figure 15.5 and 15.6** in **Appendix 15.2**).

15.15.12 In the UK, the heaviest snowfalls tend to occur when the air temperature is between zero and 2°C (Met Office, N.Dd). There is less certainty in the magnitude of change to snow occurrence and amount, although climate models do show a downward trend in both falling and lying snow over time.

Extreme Weather Events

15.15.13 UKCP18 projections indicates an almost continuous increase in annual average temperature over the next 80 years. Annual precipitation is shown to vary year on year, with some years being drier or wetter than previous years.

Heatwaves

15.15.14 A heatwave is an extended period of hot weather relative to the expected conditions of the area at that time of year, which may be accompanied by high humidity. For the UK, the Met Office defines a heatwave as “when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold” (Met Office, N.De). The threshold varies by county and have been calculated using the 1981-2010 climatology of daily maximum temperature at the mid-point of the meteorological summer (15 July), which for the Site is 21.6°C. As outlined in **Table 15.10** above, temperatures are projected to increase by 4.9°C by 2099, which will exceed the threshold for this region.

15.15.15 Research has found that the likelihood of heatwave events in the UK is about 10 times higher due to climate change (Vautard R. *et al.*, 2019). As discussed above, the maximum

summer air temperature and annual average air temperature is expected to increase over the next 80 years, which could result in more intense and more frequent heatwaves.

Extreme Cold Snaps

- 15.15.16 It is projected that winters may become increasingly milder, with minimum temperatures set to rise to over 4°C by 2099. Natural variations may mean that some cold and/or dry winters may still occur.

Heavier Rainfall

- 15.15.17 Heavy rainfall that may lead to flooding is hard to predict in the long term. A study has shown that an extended period of extreme winter rainfall in the UK is now about seven times more likely due to human-induced climate change (Christidis and Stott, 2015), although the largest changes in heavy rainfall since 1961 have occurred in Scotland and northern England.
- 15.15.18 The climate projections for the Site show there will be an increase in average winter precipitation (**Figure 15.6** in **Appendix 15.2**). There is also a pattern of larger increases in winter precipitation over southern and central England toward 2099.
- 15.15.19 While projections indicate a trend that summers will become dryer toward the end of the century, there is also evidence that summer rainfall events may become more intense when they do occur.

Low Rainfall and Drought

- 15.15.20 Droughts are natural events which occur when a period of low rainfall creates a shortage of water. The UKCP18 projections show a trend toward drier summers on average, although the uncertainties of these are wide ranging. Research on the influence of climate change on drought in the UK is limited and given the several different factors that influence droughts (meteorological, hydrological, and societal), it is challenging to identify whether drought events will become more common and prolonged in the future.

High Winds

- 15.15.21 On average throughout the year, near-surface wind speeds are projected to decrease. However, during the winter season, where more significant impacts of winds are experienced (Met Office, 2019), near-surface winds speeds are projected to rise towards the second half of the 21st Century.
- 15.15.22 However, these projections are modest compared to natural variability from month to month and season to season. Projections of future wind and storm occurrence and intensity are uncertain and confidence in projections is low. Research has shown that there are no compelling trends in maximum gust speeds over the last four decades (Kendon *et al.*, 2019) and therefore there is no evidence that link climate change and storms.

Summary of Projected Climatic Changes

- 15.15.23 In summary, it is anticipated that the Proposed Development will experience the following climatic changes:
- An increase in average annual temperature
 - An increase in maximum temperature, particularly in the summer
 - More extreme rainfall events
 - An increase in winter rainfall

- A reduction in summer rainfall

15.16 Embedded Mitigation

15.16.1 The Proposed Development has been designed to incorporate mitigation and adaptation measures to address climate change. This section provides a summary of these measures below, many of which have been addressed in full in other discipline chapters within this ES:

- **Flood risk:** In accordance with the NPPF, all flood vulnerable development will be located outside of the modelled flood extents. This is effective inherent mitigation against tidal flooding. A surface water management strategy has been prepared, which has been designed to manage runoff up to the 1 in 100 year storm event, plus a 40% increase in peak rainfall intensity to account for the likely effects of climate change.
- **Retention and Creation of Habitats, Green Infrastructure and Open Space:** the incorporation of green infrastructure and natural open space, provision of soft landscaping across the Site, as shown on the Strategic Landscape Parameter Plan (**Appendix 3.1**), will provide floral diversity within the Site, helping to provide climate resilience. The Design Guide sets out principles for the planting strategy, including using a selection of native species of local provenance. Where practicable, the selection of native plant and tree species will include species that are deemed suitable for future climate conditions, including tolerance to higher temperatures, drought resilience and species that require less irrigation.

15.17 Assessment of Likely Effects

15.17.1 The projected climatic changes outlined in **Section 15.15** above may have a direct impact on the Proposed Development or result in secondary impacts which may impact the performance or integrity of the Proposed Development i.e. a 'climate hazard'. A summary of the potential climate hazards as a result of the projected climatic changes is provided below, with more detail provided in **Table 15.11**. As a result of the projected climatic changes, there is an increased risk of:

- Long term changes to climate norms;
- Heatwaves;
- Low rainfall and drought; and
- Increased risk of flooding as a result of more extreme rainfall events, and increased rainfall during winter.

Receptor	Receptor Sensitivity	Climate Hazard	Potential Impact (with Embedded Mitigation)	Significance
Future users of the Site	Moderate to High	Long term changes to climate norms	Increased temperatures and drier summers may affect human behaviour with, for example, an increase in outdoor activity. The Proposed Development includes a network of open spaces, including footpaths, recreational cycle routes and areas for informal recreation. However, as noted in Chapter 8 Health, Wellbeing and Social extreme conditions will have the greatest adverse impacts on health. The design of the Proposed Development and open spaces considered creating shade and allowing throughflow of air to allow for cooling and reduce risk of overheating. The warmer winters and reduced risk of cold snaps may have potentially positive outcomes for those with circulatory and respiratory impacts.	Minor
		Heatwaves	As noted in Chapter 8 , extreme conditions have adverse impacts on human health, with most vulnerable to heatwaves likely to be those with circulatory and respiratory conditions. Embedded mitigation in the design of the Proposed Development, for example the provision of open space will help to provide evaporative cooling at night. This will help to reduce the risk of building overheating and maintain thermal comfort during periods of extreme heat.	Minor
		Low rainfall and drought	Periods of low rainfall and drought have the potential to adversely affect public water supply. Water companies have a statutory duty to maintain a secure water supply during a drought and to produce Water Resources Management Plans (WRMP), which consider climate change and drought.	Negligible
		Heavy rainfall and flooding	Flooding has the potential to isolate future users of the Site, disrupt service provision, damage homes and increase risk to human health, in particular mental health. Chapter 13 Water Environment assesses the likely significant effects of flood risk and states that there will be a Negligible effect with the implementation of the Surface Water Management Strategy and ongoing maintenance and management.	Negligible
Infrastructure, including buildings and roads	Moderate	Long term changes to climate norms	Infrastructure may require more maintenance and repair as changes to climatic norms may cause increased stress on, for example, below ground cables and pipes. This will be managed as each plot comes forward in more detail, where risk assessments will be undertaken to manage risks from future climate change in accordance with nationally accepted standards and guidance	Negligible
		Heatwaves	Extremes in temperatures have the potential to damage infrastructure, for example causing tarmac to soften, melt and be more susceptible to damage. As a result, additional maintenance and emergency repairs may be required. This will be managed as each plot comes forward in more detail, where risk assessments will be undertaken to manage risks from future climate change in accordance with nationally accepted standards and guidance.	Negligible

Ecology, landscaping and planting		Low rainfall and drought	Reduction in rainfall could cause soil moisture deficits, which may affect soil stability. This may increase risk of damage to infrastructure. This will be managed as each plot comes forward in more detail, where risk assessments will be undertaken to manage risks from future climate change in accordance with nationally accepted standards and guidance.	Negligible
		Heavy rainfall and flooding	Increased precipitation during the winter and more intense rainfall events are likely to increase flood risk and surface water run-off. This could prevent the use of and/or damage infrastructure and also adversely affect water quality. Chapter 13 assesses the likely significant effects of flood risk and states that there will be a Negligible effect with the implementation of the Surface Water Management Strategy.	Negligible
	Moderate	Long term changes to climate norms	As noted in Table 15.8 above, the semi-habitats identified onsite are not considered to be of high vulnerability to the broad effects of climate change such as changes in average temperatures or changes to the hydrology. Climate change is understood to be having an effect on the migration patterns of some bird species, with 'short stopping' a recognised effect, whereby birds stop short of completing historical migrations because suitable foraging resources remain available closer to their breeding grounds. Those bird species recorded are generally limited to common and / or widespread species which in this geographical location are unlikely to be significantly affected. Specific species recorded onsite considered of relatively greater sensitivity are associated with wetter habitats such as Marsh Harrier <i>Circus aeruginosus</i> , Cetti's Warbler <i>Cettia cetti</i> and Reed Warbler <i>Acrocephalus scirpaceus</i> , but as described in Table 15.8 these habitats are considered to have existing resilience to such effects. For other species groups recorded at the Site such as bats, reptiles and amphibians most species recorded are widespread across the UK or are regionally common. Such species that rely on hibernation are reducing their period of hibernation due to warmer winters that also effects their ability to enter into hibernation states resulting in reduced body condition and survival rates. However, the effects of climate change may allow for the northward expansion of such species range, including Horseshoe bats <i>Rhinolophus</i> sp. that have strongholds within the south of England and Wales, although this will depend on their ability to move between fragmented habitats. Existing pressures such as habitat loss and land use (e.g. intensive agriculture) are more important limiting factors as well as their reliance on specific hibernation features. Again, whilst some specific species may be more sensitive to the effects of climate change than others, it is considered that the overall species assemblage would not be significantly affected.	Minor
		Heatwaves	Increased frequency of extreme weather events such as heatwaves could change the type and structure of vegetation. The selection of native plant and tree species will include species that are deemed suitable for future climate conditions, including being tolerant to higher temperatures.	Minor
		Low rainfall and drought	In respect of the wetland features, it should be noted that the Site is located within the Somerset Levels and Moors landscape that has a heavily modified network of waterways	Minor

			that facilitates the regulation of water levels and quality, thereby an existing regime is in place, providing resilience to such effects. The planting strategy includes the consideration of species that are drought resistant and need less irrigation, which will increase resilience and reduce pressure on water supply during a drought.	
		Heavy rainfall and flooding	In consideration of the Proposed Development in relation to ecology and climate change, as noted above the sensitivity is focussed upon wetter habitats which would be expected to experience more periodic drought or flooding. However, as noted above, the wider landscape forms part of a heavily modified network of waterways that allows for the regulation of water and given that a surface water management plan is to be developed for the Site, this will add further resilience to the system. In addition, given the wide range of ecological mitigation to be provided as part of the Proposed Development, including the implementation of appropriate habitat creation, and betterment through targeted management, it is considered that further resilience to the effects of climate change will be provided in ecological terms. Flooding has the potential to damage planting and habitats on Site. The Surface Water Management Strategy has been designed to mimic as closely as practical the hydrology of the undeveloped catchment, therefore, as stated in Chapter 13 effects are expected to be Negligible.	Negligible

Table 15.11 Climate Change Risk Assessment

15.18 Further Mitigation

- As each plot comes forward in more detail, measures to reduce water demand and increase water efficiency in line with Building Regulations Part G will be considered to further increase resilience to droughts. This will in turn, also provide GHG emission savings. These measures may include measures such as:
 - Dual flush toilets - to reduce water consumption
 - Leak detection systems
 - Flow control devices - to reduce the flow rate of kitchen sink and bathroom basin taps
 - Installing pulsed water meters with pulsed output and fitting sub-meters – to reduce the energy demands associated with water heating
 - Using water-efficient appliances (e.g. those with an 'A' or 'B' rating as defined by the European Water Label).
- As outlined in **Chapter 12 Biodiversity**, an Ecological Mitigation and Enhancement Strategy (EMES) will be prepared for the Site to be secured by way of planning condition. This report will include consideration of the maintenance / management measures associated with onsite ecological networks and features that are to be retained, enhanced and created within the Proposed Development. This would increase the long-term resilience of habitats and species within the Site and managing areas that may be affected by droughts.

15.19 Residual Effects

- 15.19.1 The minor adverse effect on human health as a result of the increased likelihood and frequency of heatwaves has been mitigated as far as possible with embedded mitigation. Mitigating these effects further is reliant on aspects outside the scope of the Proposed Development, such as increasing the resilience of health services and availability of emergency services. Therefore, these effects remain as minor adverse, which is considered to be Not Significant.
- 15.19.2 Potential minor adverse effects to ecology, landscaping and planting resulting from droughts and storms would be managed through the implementation of the EMES. The likely effect is therefore considered to be negligible and Not Significant.

15.20 Monitoring

- 15.20.1 No significant effects have been identified in relation to climate vulnerability and resilience, therefore no monitoring is proposed. However, monitoring of the existing retained and proposed planting will be undertaken as part of the EMES.

15.21 Summary

- 15.21.1 This Chapter has assessed the likely significant effects of the Proposed Development on climate change, and the likely significant effects of climate change on the Proposed Development, with due regard to IEMA guidance.

GHG Emissions Assessment

- 15.21.2 The GHG emissions assessment provided a qualitative description of the anticipated GHG emissions arising during the construction and operational phases of the Proposed

Development. During construction, Significant local effects were identified in relation to combustion of fossil fuels during construction activities (Minor Adverse), land clearance and enabling works (Minor adverse), and consumption of electricity for office / welfare facilities and lighting (Minor Adverse). During the operational phase, Significant effects were identified in relation to transport emissions of the Proposed Development (Minor Adverse), carbon sequestration (Minor Beneficial) and electricity purchased from the national grid (Moderate Adverse).

- 15.21.3 Embedded mitigation measures to reduce GHG emissions associated with the Proposed Development includes the implementation of a FDCEMP, sustainable transport proposals and an extensive green infrastructure network. Further mitigation measures to reduce GHG emissions include energy efficiency design principles, consideration of low and/or zero carbon technology and EV charging infrastructure which are secured within the Design Guide. It is also acknowledged that the Proposed Development is an enabler of low carbon industries which could result in wider carbon reductions beyond the Site GHG emissions.
- 15.21.4 All effects identified in the GHG emissions assessment are considered Significant on a local scale however the Proposed Development addresses these emissions with mitigation in line with local policy. In the context of Government policies and national strategies that will lead to national GHG reductions, it is considered that GHGs resulting from the Proposed Development will be Not Significant on a national scale.

Climate Change Risk Assessment

- 15.21.5 UKCP18 climate projections were used to establish evolving baseline climate conditions up to 2099. It is expected that the Proposed Development may experience warmer, drier summers and milder, wetter winters, along with an increase in frequency and intensity of extreme weather events such as droughts or heatwaves. This has the potential to adversely affect receptors within the Proposed Development, including future users of the Site, buildings and infrastructure, and ecology.
- 15.21.6 The climate resilience assessment identified key environmental receptors to climate change and determined their sensitivity to the projected climate change impacts. During the operational phase, infrastructure such as buildings and roads, and ecology, landscaping and planting were determined to be moderately vulnerable, and future users of the site including residents, employees and students, were determined to be moderately to highly vulnerable to climate change. The effects of climate change on the Proposed Development are determined to be Not Significant (Minor-Negligible).
- 15.21.7 Embedded mitigation to address climate change includes the development of a surface water management strategy to address flood risk, and the retention and creation of habitats, green infrastructure and open space. Further mitigation includes the implementation of a FDCEMP, an EMES, and consideration of water efficiency measures.

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16 Cultural Heritage

16.1 Introduction

- 16.1.1 This Chapter reports the likely significant effects of the Proposed Development in terms of Historic Environment in the context of the Site and surrounding area. In particular it considers the likely significant effects of direct and indirect impacts upon both potential archaeological and heritage receptors comprising both designated and non-designated heritage assets.
- 16.1.2 The assessment is supported by the following technical appendices:
- A summary of planning policy and guidance (**Appendix 16.1**);
 - A Historic Environment Desk-based Assessment (DBA) (Wessex Archaeology 2021a; **Appendix 16.2**); and
 - A geophysical survey undertaken Outside ROF fence (Wessex Archaeology 2021b; **Appendix 16.3**).
- 16.1.3 This Chapter has been prepared by Wessex Archaeology. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.

The Proposed Development

- 16.1.4 In general, the Proposed Development entails the construction of a smart campus and community known as 'Gravity Enterprise Zone' on the former site of the ROF closed in 2008. A detailed development description can be found in **Chapter 3**.
- 16.1.5 The parameter plans, which are included as **Appendices 3.1a-g**, show the proposed land divisions between the commercial rail area (including the train station), the energy distribution and management infrastructure area, the residential and community area, the general commercial area (including leisure, education, hotel, residential and energy generation), the sports and leisure area and the open space and biodiversity zones.
- 16.1.6 The commercial rail area forms the core of the Proposed Development and is bordered by open space to the north, north-east and north-west, by the commercial space to the south, and by the energy and sports and leisure areas to the south-east and south-west respectively. There is also a transition zone between the sports and leisure and commercial areas.
- 16.1.7 Overall, the Proposed Development comprises up to 750 homes. Based on the parameter plans, building heights will range between 2 to 5 storeys, with the tallest buildings slightly set back from Woolavington Road (which borders the southern extent of the Site) and surrounded by the 2-3 storey buildings which face the road and form the northern development boundary adjacent to the open space.
- 16.1.8 In addition to the above, the Proposed Development includes the construction of temporary workforce compounds and accommodation for contractors (which will be removed once the development is in Operation), and the potential for the replacement of the rail bridge over the M5. The design of this, should it be required, is currently not understood.

16.2 Policy, Legislation, Guidance and Standards

- 16.2.1 The relevant legislation, policy and guidance are listed below, with details provided in **Appendix 16.1**.

Legislative Framework

16.2.2 The applicable legislative framework is summarised as follows:

- The Ancient Monuments and Archaeological Areas Act 1979;
- National Heritage Act 1983;
- The Protection of Military Remains Act 1986;
- The Treasure Act 1996;
- The Planning (Listed Buildings and Conservation Areas) Act 1990;
- The Hedgerows Regulations 1997 (as amended 2002); and
- The Burial Act 1997.

Planning Policy

16.2.3 The applicable planning policy is summarised as follows:

- The National Planning Policy Framework (NPPF 2021) Section 16: 'Conserving and Enhancing the Historic Environment'; and
- Sedgemoor Local Plan 2011-2032:
 - Policy D2: Promoting High Quality and Inclusive Design;
 - Policy D26: Historic Environment

Guidance

16.2.4 The applicable guidance is summarised as follows:

- Standard and guidance for historic environment desk-based assessment (ClfA 2014);
- Historic Environment Good Practice Advice in Planning Note 2: 'Managing Significance in Decision Taking' (Historic England 2015) (GPA2), which provides information on best practice relating to historic environment policy in the National Planning Policy Framework (NPPF) and National Planning Practice Guide (NPPG);
- Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) 'The Setting of Heritage Assets' (Historic England 2017) (GPA3)) which offers guidance on managing change within the setting of heritage assets;
- Statements of Significance: Analysing Significance in Heritage Assets (Historic England 2019) which explores the assessment of significance of heritage assets;
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (Historic England 2008) which provide a clear framework of what conservation means and how it should be approached;
- Design for Roads and Bridges (DMRB), LA 104 and LA 106 Cultural heritage assessment (Highways England 2020);
- National Heritage Protection Plan (2011); and

- Scheduled Monuments and Nationally Important Non-Scheduled Monuments (DCMS 2013).

16.2.5 The guidance and policy set out, amongst other things, approaches to providing the evidence base to support the assessment as well as guidance on staged approaches to assessment. The guidance issued by Historic England, whilst ostensibly dealing with setting, supports the NPPF position by making it clear that the importance of setting is what it contributes to an asset's significance.

16.3 Consultation

16.3.1 **Table 16.1** summarises the consultation undertaken to date.

Organisation And role	Date and form of consultation	Consultation/Scoping Response	Scheme Responses
Historic England	Awaiting scoping response	The Scoping Response will indicate where the primary issues for assessment lie. Additional and/or supplementary consultation may be undertaken following this, however, consultation prior to the scoping response is likely to illicit the same outcome.	N/A
Sedgemoor District Council	Awaiting scoping response	The Scoping Response will indicate where the primary issues for assessment lie. Additional and/or supplementary consultation may be undertaken following this, however, consultation prior to the scoping response is likely to illicit the same outcome.	N/A
South West Heritage Trust Senior Historic Environment Officer	17/06/2021 via email	Additional consultation undertaken to update the situation on geophysical survey and to explain access issues. No response received as of production of this chapter; additional contact made.	N/A
South West Heritage Trust Senior Historic Environment Officer	28/07/2021 via email to SDC	Mr Steve Membrey submitted a Scoping Opinion note to SDC stating that they are happy with the proposed approach of assessing cultural heritage and heritage impacts following the methodology laid out in the DMRB. Furthermore, Mr Membrey confirmed that they have no objection to the method or scope of the assessment.	The DMRB methodology has been applied to this Chapter.
South West Heritage Trust & Sedgemoor District Council	Various	As part of the Gravity community engagement programme, Gravity, Sedgemoor District Council and South West Heritage Trust recorded the social history of the Site and its previous uses with the help of the local community and the former workforce.	N/A

Table 16.1 Summary of Consultation Undertaken to date

16.4 Assessment Methodology

Scope of the Assessment

- 16.4.1 This assessment has considered to what extent the Proposed Development could have an effect on the heritage significance of designated and non-designated heritage assets within the Site and within a defined Study Area (see below).
- 16.4.2 For the purposes of this assessment, heritage assets are deemed to be both above ground (built heritage) and below ground (archaeological remains). The assessment has considered both direct (physical) and indirect (largely visual) effects as well as cumulative effects upon the following cultural heritage receptors:
- Archaeology – above and below ground, designated or not. Consideration will be given to the potential for unknown (buried) archaeological remains to exist within the Site;
 - Cultural heritage – World Heritage Sites, Scheduled Monuments, Listed Buildings, Registered Historic Parks and Gardens, Registered Battlefields and Conservation Areas; and
 - Heritage assets marked or publicised (for example archaeological/heritage trails).
- 16.4.3 As the Proposed Development has the potential to lead to both direct and indirect impacts on heritage assets, all aspects of the historic environment have been considered within this assessment and none scoped out.

Study Area

- 16.4.4 For the purposes of this assessment, a 1 km Study Area was established around the Site from which information from a variety of sources was gathered to provide a sufficient baseline to assess the potential for archaeological remains to be present within the Site.
- 16.4.5 For designated heritage assets, a nominal 5 km Study Area was used to establish the potential or impacts to designated heritage assets from a change in setting. Where deemed appropriate and through the application of professional judgement, assets outside of this Study Area were included within the assessment where these were deemed to be potentially sensitive receptors.

Baseline Data Collection

- 16.4.6 The baseline for the Cultural Heritage Assessment has been gathered in line with the parameters set out during scoping.
- 16.4.7 The assessment has taken account of the information gathered for the new Historic Environment Desk-based Assessment ([Appendix 16.2](#)) and a geophysical survey carried out Outside ROF fence ([Appendix 16.3](#)).
- 16.4.8 The baseline has also considered the archaeological mitigation measures which have already been undertaken as part of the 2017 Planning Consent. This includes mitigation for the loss of historic buildings Within ROF fence.

2032 Baseline

- 16.4.9 The 2017 Planning Consent followed the 2012 remediation consent which concerned a comprehensive programme of Site remediation, which was concluded in November 2020.
- 16.4.10 The 2017 planning consent including the demolition of former industrial buildings, considered mitigation for the loss of archaeological remains through physical impacts, any changes to

these assets' forms part of the 2032 baseline and there will be no additional effects upon any archaeological remains within ROF Fence.

- 16.4.11 As an additional response to the Gravity community engagement programme, collaborative work with Gravity, Sedgemoor District Council, and South West Heritage Trust, saw the welcoming of the community and former workforce to record the social history of the Site and its previous uses. Open events on Site informed a short film capturing knowledge and memories.
- 16.4.12 In consideration of archaeology, for the 2032 baseline, there will have been no change in the quantum of archaeology within the Site and Study Area, rather, there may be an increased calibration of our understanding of the nature of the archaeological resource.
- 16.4.13 Previous Cultural Heritage assessments carried out for the 2017 Planning Consent did not identify any significant effects to designated heritage assets through a change in setting. For the purposes of this assessment, any potential effects in this regard can therefore occur through changes to the built form as set out within the 2017 Planning Consent, for example from taller buildings, or from development within the extended footprint of the Site.

Sensitive Receptors

Summary of heritage assets within the Site and identified sensitive receptors

- 16.4.14 The following sensitive receptors within the Site have been identified based on the known and recorded resource presented above:
- Potential archaeological remains associated with the prehistoric and Romano-British occupation of the area;
 - Potential archaeological remains associated with medieval and post-medieval agricultural practices; and
 - As yet unknown potential archaeological remains.

Summary of heritage assets outside of the Site and identified sensitive receptors

- 16.4.15 An initial assessment of the potential impact of the Proposed Development could have upon the heritage significance of designated heritage assets was carried out as part of the DBA (**Appendix 16.2**). This assessment was undertaken to identify assets which may experience an impact to their heritage significance through a change in their setting. A more detailed methodology is included within the DBA.
- 16.4.16 The settings assessment undertaken within the DBA used a nominal 5 km Study Area and a Zone of Theoretical Visibility (ZTV) (a more detailed methodology explaining the mechanics of the ZTV is included within **Appendix 16.2**). The ZTV indicated that the low-lying nature of the landscape led to widespread visibility in the surrounding area. However, as the ZTV uses a 'bare earth' scenario, it was clear from the Site visit that there was intervening vegetation and buildings between the Site and many of the identified assets within 5 km.
- 16.4.17 However, the Site visit did indicate that the Site shared visibility with the Scheduled Monument at Brent Knoll approximately 7 km to the north which, as a result, has been scoped into further assessment.
- 16.4.18 The following designated heritage assets have been identified as being potentially sensitive receptors to the Proposed Development based on the results of the DBA (see **Figure 3, Appendix 16.2**):

- The Grade I listed Church of St Michael and the Angels, Puriton (NHLE 1344664);
- The Grade II listed Manor Farmhouse, Puriton (NHLE 1060137); and
- The Scheduled Monument Brent Knoll hillfort and associated field system (NHLE 1008248).

16.4.1 Based on the detailed assessment presented in the DBA (see **Appendix 16.2**) the remaining assets within the 5 km Study Area were scoped out of further assessment. The locations of designated heritage assets are shown on **Figure 3** of **Appendix 16.2**.

16.4.2 Assessment of Significance

16.4.3 The methodology used within this assessment considers the following:

- The heritage significance of a receptor and its sensitivity to an impact;
- The magnitude of change; and
- The significance of effect upon the heritage significance of receptors.

16.4.4 The ES identifies and assesses potential direct and indirect impacts upon both archaeological and heritage receptors. Potential effects upon the archaeological and heritage receptors arising from the Proposed Development can be adverse or beneficial; short or long term; permanent or temporary and cumulative/in combination with other planned schemes.

Direct Impacts

16.4.5 The assessment of direct impacts considers physical effects upon features of heritage interest, whether known or unknown Sites or potential Sites, consisting of archaeological remains and/or elements of built heritage, which are in danger of being disturbed or destroyed. Direct impacts occur during the demolition/construction phase and are typically permanent and irreversible.

Indirect impacts

16.4.6 Paragraph 194 of the NPPF requires that an applicant should provide a description of the significance of any heritage assets affected by any development and the contribution their setting makes to that significance.

16.4.7 Setting consists of the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate the significance of that asset or may be neutral.

16.4.8 Therefore, the importance of 'setting' is in what it contributes to the significance of an asset, simple intervisibility or proximity to a Proposed Development is not considered to constitute harm in itself, and 'setting' is not a designation.

16.4.9 Setting can be tangible, such as a defined boundary, or intangible, such as an atmosphere or ambience. Setting is not simply defined within a visual envelope but can include an archaeological or historic context, which may not be visually apparent.

16.4.10 When assessing the potential for indirect impacts, the primary concern is the degree to which the heritage significance of an asset, or the ability to appreciate and understand that significance, is being impacted.

16.4.11 Indirect effects can occur during both the construction and operation phase and can be both permanent and temporary.

Significance Criteria

16.4.12 Significance, in heritage terms, is defined in national planning policy as:

'The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural artistic and historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.'

16.4.13 In order to avoid confusion with significance of effect, which is set out below, significance in relation to the value of a heritage asset will be referred to in this assessment as 'heritage significance'.

16.4.14 There is no industry standard method for assessing how significant heritage assets are, however, there are criteria set out within the Design Manual for Roads and Bridges (DMRB; 2020) as well as guidance set out within Statements of Heritage Significance (Historic England 2019) which are widely used across the industry. DMRB sets out a series of levels of significance of an asset which for this assessment has been adapted, with reference to Historic England guidance and the NPPF glossary, to encompass both designated and non-designated heritage assets.

Heritage Significance	Description
High	World Heritage Sites, Scheduled Monuments, Grade I and II* Listed Buildings, Registered Battlefields, Registered Parks and Gardens, and non-designated assets of equivalent heritage significance which are considered to be potentially nationally important. Grade II heritage assets that can be shown to have exceptional qualities in their fabric or historical associations, especially where they are of national importance.
Medium	Grade II Listed Buildings, regionally important archaeological features and areas (as defined in the Historic Environment Record). Grade II Registered Parks and Gardens. Conservation Areas, which are considered regionally important.
Low	Sites and features noted as locally important in the Historic Environment Record. Other, non-designated features of cultural heritage significance.
Negligible	Assets compromised by poor preservation and/or poor contextual associations. Or very common archaeological features / buildings of little or no value at local or other scale.

Table 16.2 Levels of Heritage Significance

16.4.15 Whilst the categorisation of Listed Buildings by Historic England implies different levels of heritage significance, as reflected in the table above, all Listed Buildings are afforded the same level of legal protection.

16.4.16 While this table nominally sets out heritage significance levels, in all instances professional judgement will be used in determining heritage significance. Where assets are placed in a different category to those set out above, a rationale and justification will be made explicit in the text, where relevant.

Magnitude of Change

16.4.17 Magnitude is a means to measure the nature of a predicted change to the heritage significance of an asset and is broken down in Table 16.3.

16.4.18 Direct impacts are permanent, as the loss of or damage to archaeological receptors cannot be repaired, replaced or recreated. Indirect impacts can occur through changes in setting (arising from visual intrusion, etc.) which may cause a reduction in the contribution that the setting

makes to the heritage significance of an asset, so that there is an impact (reduction) in the overall heritage significance of the asset, or that the heritage significance can no longer be appreciated or experienced.

Level of Magnitude	Definition
Very High	Total loss of or major alteration to a Site, building or other feature (e.g., destruction of archaeological feature, demolition of a building). Blocking or severance of key visual or other relationship. Disassociation of an asset from setting or other major change in setting, so as to cause wholesale loss of heritage significance for a heritage asset and completely prevent the heritage significance of an asset from being appreciated and/or experienced.
High	Major physical damage to or significant alteration to a Site, building or other feature. Extensive change (e.g., loss of dominance, intrusion on key view or sightline) to the setting of a Scheduled Monument, Listed Building or other feature registered as nationally important, which may lead to a major reduction in the contribution of that setting to the heritage significance of the asset so that the asset loses heritage significance, and a major reduction in the ability to experience and/or appreciate that heritage significance.
Medium	Damage or alteration to a Site, building or other feature. Encroachment on an area considered to have a high archaeological potential. Change in setting (e.g., intrusion on designed sight-lines and vistas) to monuments / buildings and other features, which may lead to a moderate reduction in the contribution of that setting to the heritage significance of the asset and a consequent change/reduction in the ability to experience/appreciate that heritage significance.
Low	Minor damage or alteration to a Site, building or other feature. Encroachment on an area where it is considered that low archaeological potential exists. Minor change in setting (e.g., above historic skylines or in designed vistas) of Monuments, Listed Buildings, Sites and other features, which may lead to a small reduction in the contribution the setting makes to the heritage significance of the heritage asset, resulting in limited loss of heritage significance. Limited change in or reduction of the ability to experience or appreciate the heritage significance of an asset.
Negligible	No physical effect. Slight or no change in setting, with no or very limited change in the contribution that setting makes to the heritage significance of the asset. No or minimal change in the ability to experience or appreciate the heritage significance of the asset.

Table 16.3 Magnitude of Change Criteria

Significance of Effect

16.4.19 The significance of an effect in EIA is binary, either an effect is significant, or it is not. This is different to the (heritage) significance of a heritage asset, the criteria for which is set out above.

16.4.20 Effects that are deemed to be significant for the purposes of this assessment are those that are described as being of a moderate, major or substantial (beneficial or adverse) level. The significance of any effect can be arrived at by assessing heritage significance against magnitude as shown in **Table 16.4**.

Magnitude of Change	Sensitivity of Receptor			
	High	Medium	Low	Negligible
Very High	Major	Major	Moderate	Negligible or No Effect
High	Major	Major	Moderate	Negligible or No Effect
Medium	Moderate	Moderate	Minor	Negligible or No Effect
Low	Minor	Minor	Minor	Negligible or No Effect
Negligible	Negligible or No Effect	Negligible or No Effect	Negligible or No Effect	Negligible or No Effect

Table 16.4 Significance of Predicted Effects

16.4.21 Potential effects that are assessed as 'Minor' or 'Negligible or No Effect' as shown on the matrix are considered to be 'Not Significant' in terms of the EIA Regulations.

16.4.22 An alignment of how 'substantial' and 'less than substantial harm' equates to effects as assessed in this Cultural Heritage chapter only, is provided within **Appendix 16.1**.

Limitations

16.4.23 Data used to compile this assessment consists of information derived from a variety of sources, only some of which have been directly examined for the purposes of this study. The assumption is made that this data, as well as that derived from other secondary sources, is reasonably accurate.

16.4.24 The Historic Environment Record (HER) is not a record of all surviving heritage assets, but a record of the discovery of a wide range of archaeological and historic components of the historic environment. The information held within it is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.

16.4.25 This assessment was written in June and July 2021. Due to the COVID 19 pandemic, a number of repositories were closed to the public to help combat the spread of the disease. Every effort has been made to mitigate this through the use of available online sources.

16.5 Baseline Conditions

Current State of the Environment

Site description

16.5.1 The Site is located between the villages of Puriton and Woolavington, approximately 6 km north-east of the town of Bridgwater, Somerset.

16.5.2 The Site mainly comprises the remnants of the former Royal Ordnance Factory (ROF) Puriton which has been remediated. Many of the former buildings have been removed as part of the remediation.

- 16.5.3 The remainder of the Site to the south and east of the ROF Site is primarily comprised of agricultural fields subdivided with mature hedgerows and used as either pasture or grassland. The area to the west mainly comprises the route of a former railway line into the Site with some agricultural fields on either side, while to the north a spur is comprised of a series of reed beds.
- 16.5.4 The topographic elevation of the Site varies between 50 m above Ordnance Datum (aOD) on a ridge of high ground to the south, sloping down to c. 4.5 m aOD to the north.
- 16.5.5 The underlying geology is mapped as Langport Member, Blue Lias Formation, and Charmouth Mudstone Formation interbedded Limestone and Mudstone which are overlain, across most of the Site, by superficial Tidal Flat Deposits (British Geological Survey online).

Archaeological and historical background to the locality

- 16.5.6 The Site is situated at the edge of two distinct environments, the Somerset Levels to the north and a prominent topographic ridge which overlooks the River Parrett and tidal flats further to the south. The Somerset levels have been subject to continual cycles of sea regression and transgression throughout prehistory which will have been reflected in the human activity within the area. (It should be noted that detailed flood modelling demonstrating low risk of inundation has been completed as part of the hydrology baseline and evidence base and it is important to note that no flood events have affected the Site since its construction).
- 16.5.7 The overall low elevation of the area coupled with its proximity to the sea has resulted in areas of slightly higher topographic prominence to be the focus for settlement and activity from the earliest prehistoric period onwards.
- 16.5.8 Although the earliest evidence for human activity in the Study Area dates to the Mesolithic period (PRN 10711), evidence for consistent occupation is first visible from the Bronze Age onwards.
- 16.5.9 A potential Bronze Age settlement is recorded by the Historic Environment Record (HER) immediately adjacent to the Gravity Link Road, south of Woolavington Road, which was identified during a geophysical survey (PRN 42550). The anomalies identified during the survey included a rectilinear enclosure and an L-shaped enclosure which are consistent with similar features found elsewhere in the region.
- 16.5.10 Excavations carried out within the Site have uncovered a rectangular ditched enclosure dating to the Early to Middle Bronze Age (Wessex Archaeology 2012d) while further evidence of Bronze Age activity is recorded approximately 680 m south of the Site where a single crouched burial was found in association with Beaker pottery (PRN 28484).
- 16.5.11 Evidence for occupation and activity during the Iron Age was also uncovered during excavations within the Site (Wessex Archaeology 2020) through an enclosure defined by a substantial curvilinear ditch. Pottery recovered from the ditch dated the deposits to the Middle to Late Iron Age and while it is thought there may have been an opposing ditch, forming an entrance, no such feature was uncovered.
- 16.5.12 Somerset became important during the Iron Age and Romano-British periods for the production of salt with possible evidence for this activity recorded by the HER approximately 350 m to the south of the Site (PRN 30211). This interpretation is, however, tentative as the features uncovered during archaeological investigations are more likely to have been associated with pottery production.
- 16.5.13 A relatively substantial Roman settlement was uncovered during the construction of the M5 motorway approximately 800 m to the south-west of the Site. The excavations here found stone paving, wall foundations and pottery including Samian ware and indicated that the settlement extended well beyond the excavation limits (PRN 10705).

- 16.5.14 Within the Site, recent excavations uncovered a substantial masonry wall which was constructed from randomly coursed, large angular limestone blocks and slabs in association with a rubble filled trench which contained 3rd or 4th century AD Roman pottery (Wessex Archaeology 2020). The presence of the unabraded pottery was suggestive of a nearby settlement with a nearby field system also found during excavation indicating the Study Area was widely occupied during the Romano-British period.
- 16.5.15 There is no evidence recorded within the HER for any activity within the Site or the Study Area during the Anglo-Saxon period, however, the record of the settlements of Puriton and Woolavington within the Domesday Survey of 1086 indicates their establishment prior to the Norman Conquest in 1066.
- 16.5.16 Both settlements are of a medium size for the time, having a population of between 80 and 100, with Woolavington noted as being within the largest 40% of settlements in the country at the time. They are located on islands of slightly higher topography continuing a pattern established in the prehistoric and Romano-British period, this is perhaps best appreciable in Puriton where the settlement's church is located on a discernible raised platform.
- 16.5.17 The centre of each settlement is focused on their parish churches, both of which were constructed in the medieval period. The now Grade I listed Church of St Michael (NHLE 1344664), located approximately 480 m south-east of the Site was constructed in the 13th century, although documentary evidence suggests that the church was founded in 1113 (Dunning 2004). Documentary evidence also indicates that the churchyard has remained in use since the founding of the church.
- 16.5.18 In Woolavington, the Grade I Listed Church of St Mary (NHLE 1060144), located approximately 470 m to the east of the Site, was originally constructed in the 11th century with extensions and alterations throughout the 13th to 15th centuries and extensively restored in the late 19th century.
- 16.5.19 Beyond the settlement, there was an increase in the reclamation of parts of the Somerset levels which had been affected by a substantial tidal inundation during the earlier parts of the Anglo-Saxon period. This reclamation process allowed for the improvement of the land immediately outside of the settlement centres which were then used for agricultural purposes. The Site lies in one of these areas with evidence still remaining in the landscape for the medieval open field system characterised by earthworks remaining within the south-eastern section of the Site in fields adjacent to Woolavington Road.
- 16.5.20 Approximately 600 m west of the Site, the HER records the extent of the medieval borough of Caput Montis (PRN 10703) which is thought to have been established before 1159 by the De Combers who were lords of the Puriton Manor. The settlement was located on a promontory projecting to the west and comprised two parallel east-west roads with crossroads that formed a simple grid, a possible chapel and port along with the now scheduled remains of its Motte and Bailey Castle (NHLE 1019291). The remains of the castle comprise part of a mound and three broadly concentric mounds which form the earthwork of a motte with two baileys.
- 16.5.21 Between the 16th and 19th centuries, the fertile area continued to be intensively farmed and much of the historic landscape in the area surrounding the Site is a product of the agricultural activities from this period. The 1842 Puriton Tithe map shows the surrounding area was subdivided into numerous, narrow strips or strip lynchets, farmed by different occupiers, and broadly aligned north to south. Historic mapping from this time also shows the extensive network of rhynes, although some of these were likely established at an earlier date.
- 16.5.22 Beyond the agricultural landscape, the settlements at Puriton and Woolavington formed the majority of the character during this period which is evidenced by the number of now listed buildings which trace their origins to the 16th, 17th, 18th and 19th centuries. Examples within the Study Area include the Grade II listed Manor Farmhouse (NHLE 1060137), located approximately 250 m west of the Site on the edge of the village of Puriton and the mid-18th century Causeway Farmhouse (NHLE 1344687) in the centre of the village of Woolavington.

- 16.5.23 In Woolavington, there is perhaps a more visible post-medieval historic character as a number of non-designated historic buildings were also constructed during this period including the late 17th century Former White Lion (PRN 36459) and Apple Tree Cottage (PRN 334753).
- 16.5.24 In the late 1930s, the Site was selected as a location for a Royal Ordnance Factory to prepare munitions for the imminent outbreak of war primarily due to its relative remoteness, its proximity to coal and chemical supplies and the ready availability of clean water. Due to the secretive nature of the operations being undertaken, the facility was identified only by its code number: ROF 37.
- 16.5.25 The factory was highly specialised and purpose-built comprising approximately 500 buildings by 1941. By 1943, the workforce at the factory comprised over 2,500 employees, many of whom were housed in 'pre-fabs' in the nearby villages.
- 16.5.26 The factory's main purpose was to manufacture components which were transported off Site to other factory Sites for assembly.
- 16.5.27 Following the end of the Second World War, production was briefly halted in favour of producing chemicals and plastics in addition to manufacturing pre-cast concrete houses to help home the millions of people displaced in the cities across the country.
- 16.5.28 Ordnance production recommenced in the 1950s as a result of the escalating tensions of the Cold War, in particular the Korean War in the early 1950s, which led to a substantial rearmament programme. The Site remained in use until 2007, after which it was decommissioned and many of the former buildings removed leaving only a handful of extant structures focused along the southern extent of the factory Site.

Geophysical Survey

- 16.5.29 A geophysical survey was undertaken across available sections of the Site outside the ROF fence (**Appendix 16.3**). Due to constraints including existing Gravity Link Road construction boundaries and ecological considerations, not all of the area was accessible, however, much of the eastern and southern sections have been completed.
- 16.5.30 The survey has indicated the presence of a number of anomalies considered to be of archaeological origin.
- 16.5.31 Within the section bounded by the Eastern and Western Approach Road, an area of fragmented positive anomalies are consistent with enclosure ditches.
- 16.5.32 Within the north-eastern section Outside ROF Fence, the survey identified a network of interconnected linear and recti-linear positive anomalies on a broadly north-east - south-west alignment and are likely to represent a series of further enclosure ditches. Towards the northern end, a positive 'keyhole' shaped anomaly has been identified that may also indicate an enclosure (**Figure 3; Appendix 16.3**).
- 16.5.33 Given the size, shape and known archaeological context of the surrounding area, it seems likely these anomalies relate to the earlier occupation of the area during the prehistoric and Romano-British periods.
- 16.5.34 The survey also returned anomalies consistent with medieval/post-medieval ridge and furrow agricultural in the field immediately adjacent to the village of Woolavington (**Figure 3; Appendix 16.3**).
- 16.5.35 In the central section of the Site outside the ROF fence, the survey has indicated that the majority of the land has been disturbed by previous activity with likely deposits of made ground in and around the entrance to the former ROF.

16.5.36 The remainder of the survey did not identify any anomalies consistent with any archaeological remains.

2032 Baseline

16.5.37 The 2032 Baseline assumes the full implementation of the 2017 Planning Consent (excluding safeguarded land)

16.5.38 The 2017 Planning Consent included an assessment of Cultural Heritage for which all mitigation measures have been undertaken in relation to built heritage (building recording for all buildings associated with the ROF prior to their demolition) and archaeology (intrusive archaeological excavations to undertake mitigation for their loss through preservation by record) and thus no further consideration is made to any potential impacts to these elements of the Historic Environment.

16.5.39 The accompanying 2013 ES, 2013 ES update and 2017 ES Addendum also identified no impacts to designated heritage assets through a change in setting.

16.5.40 The 2032 baseline also includes four 'approved developments' which are to be considered as having been implemented and fulfilled by 2032 and includes the Hinkley C consented overhead line. In respect of Cultural Heritage, these developments have the potential to result in a change to the setting of some of the designated heritage assets identified as sensitive receptors.

16.5.41 The 'approved developments' are as follows:

- Application 42/20/00014 which comprises an outline application for the erection of up to 120 dwellings with public open space, structural planting and landscaping, surface water flood mitigation and attenuation, and vehicular access point from Woolavington Road.
 - This application is located on the eastern edge of the settlement at Puriton and will effectively in-fill development up to the completed Gravity Link Road. While this will remove elements of the former rural landscape outside of the village, this will not lead to a change in setting for any designated heritage assets.
 - As a result, this development is not considered to be a material consideration in any assessment of effects in combination with the Proposed Development.
- Application 54/19/0008 comprise a hybrid (full and outline) application for the erection of 100 dwellings including 30 affordable homes and associated infrastructure. Outline application with some matters reserved for the erection of up to 75 dwellings and associated infrastructure.
 - This application is located to the south of Woolavington and while this will remove elements of the former rural landscape outside of the village, this will not lead to a change in setting for any designated heritage assets. A conclusion supported by the submitted Historic Environment Assessment (AC Archaeology 2019).
 - As a result, this development is not considered to be a material consideration in any assessment of effects in combination with the Proposed Development.
- Application 54/20/0009 comprises an outline planning application with some matters reserved for the erection of up to 125 dwellings with public open space, landscaping, sustainable drainage system (SuDS), formation of vehicular access and off site improvements.
 - This application is located on the south-eastern periphery of the settlement of Woolavington and while it may remove some of the former rural landscape outside of the village, it will not lead to a change in setting for any designated heritage assets. A

conclusion supported by the submitted Archaeology and Built Heritage Assessment (Pegasus Group 2018).

- As a result, this development is not considered to be a material consideration in any assessment of effects in combination with the Proposed Development.
- Application 54/20/0010 comprises an outline application with some matters reserved, for the demolition of stable buildings and the erection of up to 95 dwellings with public open space, landscaping and sustainable drainage system (SuDS), vehicular access point from Woolavington Road and the erection of a double garage with associated access at Westfield Farm.
- This application is located to the south of Woolavington Road on the western periphery of the settlement at Woolavington. While it may remove some of the former rural landscape outside of the village, it will not lead to a change in setting for any designated heritage assets. This is a conclusion supported by the submitted Archaeology and Built Heritage Assessment (Pegasus Group 2019).

16.5.42 None of the 'approved developments' have any significant impact to the heritage significance of any designated heritage assets.

16.5.43 Some of the 'approved developments' may result in the loss of archaeological remains within their development footprint (if present). This would unlikely result in alteration to the presence, nature or significance of the archaeological resource within the Site, unless the remains that are lost as part of the 'approved developments' are directly associated with archaeological remains within the Site and contribute to the understanding of the remains within the Site (if any).

16.5.44 However, it must also be noted that, the implementation of the 'approved developments', and the assumed appropriate mitigation undertaken following their consent, may uncover archaeological remains and thus improve our understanding of the area's archaeological resource and allow for better and more accurate interpretations.

16.5.45 . As archaeological remains are an irreplaceable resource, the 2032 baseline would likely lead to the loss of the as yet unknown archaeological resource within the Site and within the footprint of the 'approved developments'.

16.6 Embedded Mitigation

16.6.1 The nature of the Proposed Development and the construction methodologies required means that there are no design solutions which can mitigate the potential impact on buried archaeological remains.

16.6.2 For the basis of this assessment, a conservative scenario has been therefore assumed whereby any below ground archaeological remains will be entirely lost.

16.6.3 With regard to the potential for effects arising from a change in the setting of a designated heritage asset through the construction of the Proposed Development, the potential large scale of the units required are critical to its successful implementation. In order to minimise the visual intrusion into the landscape and to the background setting of especially the listed church [NHLE 1344664] and farmhouse [NHLE 1060137] which currently mainly comprises agricultural hinterland, the spatial strategy for the Site ensures the tallest buildings are located further to the north with building heights stepping down towards the areas of existing settlement at Puriton and Woolavington. The design code will also consider materials and design measures to reduce effects. While this embedded mitigation cannot preserve the loss of the agricultural hinterland within the Site, the stepped approach can lessen the visual intrusion caused by it which could lead to a change in the wider setting of the church and farmhouse.

- 16.6.4 The proposed landscaping strategy would likely, in the long term, help to reduce and filter views of the Site which will serve to alleviate somewhat any effects to designated heritage assets. However, this depends on the final design of the landscaping strategy.

16.7 Assessment of Likely Effects

- 16.7.1 This section sets out the identification and evaluation of the key potential effects of the Proposed Development with reference to the historic environment taking account of incorporated mitigation embedded within the design.

Demolition and Construction

Direct Impact - Archaeology

- 16.7.2 Any adverse effects to buried archaeological features would be permanent and irreversible in nature. Even in areas where the scale of intrusive groundworks may be relatively small, the magnitude of impact on an archaeological asset may be high.
- 16.7.3 The construction phase of the Proposed Development has the potential to result in direct permanent, adverse effects on archaeological remains within the Site. Activities associated with the Proposed Development which could have below ground effects comprise:
- Demolition of buildings and foundation removal (noting the majority has been completed within the main fenced Site);
 - Creation of a development platform (noting the current consents for this);
 - Excavation of trenches/piling for foundations;
 - Installation of services and utilities; and
 - Hard and/or soft landscaping.
- 16.7.4 The potential for archaeological remains to be present outside ROF fence is high, based on the balance of evidence provided from previous archaeological investigations.
- 16.7.5 Expert analysis determines it is likely that any remains encountered would relate to the occupation of the landscape during the prehistoric period and the Romano-British period as demonstrated through the evidence gathered from the geophysical survey. Any such remains would derive their heritage significance from their archaeological interest and the information their excavation would reveal about the occupation of the landscape and the people within it.
- 16.7.6 There is also a high likelihood for encountering remains from the medieval and/or post-medieval agricultural practices given their recorded presence within the Site and the Study Area and from the results of the geophysical survey. Any such remains encountered would be of low significance as while they indicate previous landscape use, there is unlikely to be any substantial additional information from their archaeological remains which could add to the current knowledge base.
- 16.7.7 Given the previous use of the landscape for primarily agricultural purposes, any remains are unlikely to have been disturbed and are likely to be well preserved as demonstrated through previous archaeological investigations.
- 16.7.8 Based on the available information, the heritage significance of these archaeological remains is likely to range from Negligible to Medium. The high assumed impact of the Proposed Development would therefore result in effects as ranging from **Negligible to Major Adverse Effect**, which (at the top of the range) is significant, prior to mitigation.

Indirect Impacts – Built Heritage

- 16.7.9 While there will be some additional noise and visual intrusion arising from the presence of cranes, vehicles, lighting etc. within the Site and accessing the Site, these changes are temporary, limited to working hours and for the duration of the construction programme. These will not have any significant effect on the heritage significance of any designated heritage assets through a change in setting.
- 16.7.10 Specific indirect effects on the heritage significance of heritage assets within the Site and the Study Area are considered below in relation to operation (and final built form) of the Proposed Development.

Operation

Direct Impacts

- 16.7.11 There will be no additional direct impacts during the operational phase of the Proposed Development as no further intrusive ground works or building demolitions are anticipated beyond the demolition and construction phase.

Indirect Impacts

- 16.7.12 Indirect impacts to built heritage assets are caused through the potential for the heritage significance (or the ability to appreciate and understand that significance) of heritage assets to be changed (diminished or otherwise harmed) through a loss of the contribution that their settings make to their heritage significance, as a result of development within that setting. Indirect impacts can be temporary and reversible upon decommissioning, however, in the case of the Proposed Development as decommissioning is not planned, these effects will be permanent.
- 16.7.13 The locations of the designated heritage assets identified below can be seen on **Figure 3** in **Appendix 16.2**.

The Grade I listed Church of St Michael and All Angels, Puriton (NHLE 1344664)

- 16.7.14 The asset is an Anglican parish church located within the centre of the village of Puriton, approximately 470 m to the west of the Site. Its earliest origins date back to the 13th century with later 14th and 15th century additions and was extensively renovated in the late 19th century. Constructed from coursed and squared rubble in an Early English and Perpendicular architectural style, the church retains some of its original architectural detailing externally along with a number of original internal features.
- 16.7.15 The setting of the asset is defined by its surrounding churchyard which sits on an area of relative topographic prominence within the centre of the village. This relative prominence is best appreciated from the adjacent street 'Rye' when moving towards the church from the south. The churchyard is enclosed on all sides by adjacent development and vegetation with extremely limited visibility to the landscape beyond.
- 16.7.16 The asset derives its significance primarily from its historic and architectural interest which is vested in the physical building, the architectural quality of the original church and the visible signs of its evolution over time which can be seen in the differences in building styles and architectural detailing.
- 16.7.17 In addition, the immediate setting of the churchyard makes an important contribution to its significance allowing the architectural and historic interest to be best appreciated while the wider village centre also make an important contribution to its significance allowing it to be appreciated as one of the settlement's focal points.

- 16.7.18 Although there are small gaps in the surrounding vegetation which allow for glimpsed views out to the wider landscape, these are limited and make no contribution to how the church is appreciated and thus no contribution to its significance.
- 16.7.19 There will, therefore, be no effect upon the significance of the asset through a change in setting from the operation of the Proposed Development and thus the magnitude of effect will be Negligible.
- 16.7.20 The church is an asset of High heritage significance with the magnitude of impact from the Proposed Development assessed as Negligible, resulting in a **Negligible or No Effect**, which is not significant.

The Grade II listed Manor Farmhouse, Puriton (NHLE 1060137)

- 16.7.21 The asset is a farmhouse of 16th century origin located approximately 250 m to the west of the Site. It is constructed from rough cast stone with a pantile roof and is arranged in a cross-passage plan. The farmhouse was altered and extended in the 18th, 19th and 20th centuries giving it a more irregular layout. It retains some of its original architectural detailing which is best preserved internally following the later alterations. Externally, the main visible elements on the elevation facing the road are 19th century casement windows while the roof structure and roof beams date to the 16th century.
- 16.7.22 The asset's setting is principally defined by the village in which it lies which is characterised by a mixture of buildings of varying architectural types which are both historic and modern. Beyond the village, the asset's setting comprises agricultural land within the immediate hinterland of the settlement.
- 16.7.23 The asset derives its significance primarily from its historic and architectural interest which is derived from its remaining historic fabric from the 16th century and from the appreciable evolution the farmhouse has undergone through the later alterations.
- 16.7.24 In addition, significance is also drawn from its important relationship with the agricultural fields at the edge of the settlement as the farmhouse has been a key building in the village during the post-medieval period with crops brought in from the immediate hinterland. That relationship is still appreciable both in plan and on the ground where the importance of its location can be understood.
- 16.7.25 The Proposed Development will result in the removal of the fields immediately outside of the village centre for which the asset shares a relationship. Their removal will therefore result in a reduction of the ability to appreciate or understand the significance of the Farmhouse through a loss of the historically associated land.
- 16.7.26 The scale of this impact is to be considered in conjunction with the contributing elements of the asset's significance, namely that the majority of its significance is derived from its historic and architectural interest. That historic and architectural interest is best appreciated in close proximity from the main road where the principal elevation is visible. The asset's primary setting is also best appreciated from close proximity where the evolution of the village is most visible.
- 16.7.27 The impact, therefore, will be upon only one element of the asset's significance, leaving the primary interest unchanged, which as a result leads to the magnitude of the anticipated impact considered to be Low.
- 16.7.28 The farmhouse is an asset of medium heritage significance with the magnitude of impact from the Proposed Development assessed as Low, resulting in a **Minor Adverse Effect**, which is not significant.

The Scheduled Monument Brent Knoll hillfort and associated field system (NHLE 1008248)

- 16.7.29 The hillfort is located approximately 7 km to the north of the Site and is situated on an island of high topographical prominence overlooking the surrounding landscape and out towards the Bristol Channel. The asset itself comprises a low, earthwork rampart approximately 1 m in height which encloses an area of approximately 1.6 ha, although some of the internal area has been disturbed by medieval quarrying.
- 16.7.30 Archaeological investigations have, however, uncovered the remains of a Roman building and while the fort itself is considered to be of Iron Age origin, some of the outer ramparts are probably Romano-British in date.
- 16.7.31 The setting of the fort is defined by its prominent position which offers views to and from the surrounding landscape.
- 16.7.32 The asset derives its significance primarily from its archaeological interest and through the information the archaeological remains could yield relating to the occupation and use of the fort from the Iron Age through to the Romano-British period. There is also an archaeological potential for later activities from the medieval period through to the 20th century.
- 16.7.33 The setting of the asset makes a positive and important contribution to its significance. The topographical prominence of the island upon which it sits was key to the selection of that location for the hillfort both as a defensive structure and as a reflection of its status. That prominence and the understanding of it is two-way, with views from and to the hill fort, of importance in understanding its significance.
- 16.7.34 Whilst the Proposed Development will prevent some visibility towards the asset from a limited number of locations (such as along Woolavington Road), the asset will continue to be visible from the vast majority of the surrounding landscape and the appreciation of its prominence and/or the understanding of its strategic position will remain unaltered. The availability of views from Woolavington Road is incidental and does not have a specific relationship with the asset. The importance of the hillfort in this respect lies in the availability of views from it, and its presence in views towards it is best realised at closer ranges.
- 16.7.35 Similarly, while the Proposed Development will be visible from the asset, the nature of development of the area in the past 50 years has seen a substantial increase in the number of large industrial units constructed within the surrounding landscape. The Proposed Development will therefore not represent a novel intrusion, rather a continuation along a similar vein and, over time, will be no more noticeable than the existing modern developments to the west and south-west of the Site adjacent to the M5.
- 16.7.36 While there will be a change in the setting of the asset, the scale of change within the landscape coupled with the primary significance of the asset deriving from its archaeological interest (which is not diminished), will not lead to any harm to its significance from the Proposed Development through a change in setting, and thus the magnitude of effect will be Negligible.
- 16.7.37 The hillfort is an asset of High heritage significance with the magnitude of impact from the Proposed Development assessed as Negligible, resulting in a **Negligible or No Effect**, which is not significant.

16.8 Further Mitigation

Direct Impacts – Archaeology

- 16.8.1 It is considered that the Proposed Development has the potential to affect subsurface archaeological remains, specifically on the southern lands which lie outside of the existing

main Site fence line. It is proposed to mitigate any potential effects through the implementation of an appropriate programme of archaeological works which will permit any remains to be investigated and recorded (leading to preservation by record).

16.8.2 In order to achieve this, the following approach is recommended which should be undertaken in phases as occupiers come forward and specific details on impacts are known:

- a programme of trial trenching to be undertaken post adoption of the LDO, but pre-commencement, to further establish the presence and significance of any as yet unknown archaeological remains.
- a programme of archaeological mitigation, to include Strip, Map and Record and/or watching brief depending on the scale and significance of any archaeological remains. The requirement for this element, and its scope, will only be fully understood once the trial trenching has been undertaken and the results carefully analysed in conjunction with the data gathered for the DBA and during the geophysical survey.

16.8.3 The above provides an indicative programme only and would be subject to consultations with the South West Heritage Trust.

16.8.4 This mitigation is secured within the Compliance Form.

Indirect Impacts – Built Heritage

16.8.5 The Parameter Plan indicates that the section of the Site closest to the Grade II listed Manor Farmhouse (assessed as experiencing a Minor Adverse Effect) is to be occupied with up to 50% buildings with the remainder blue and green infrastructure, a tree nursery, community use, sports, leisure or associated infrastructure. This allows an opportunity to design this part of the Site to accommodate the built structures in a way that could mitigate, as much as possible, the alteration of the rural landscape which forms part of the wider setting of the asset. This is also in line with the 'Puriton Edge' Design Drivers outlined in the 2021 Design Guide.

16.8.6 This mitigation is secured within the Compliance Form.

16.9 Residual Effects

16.9.1 The magnitude of effects during the demolition, construction and operational phases following the application of the identified mitigation measures (i.e. the residual effect) has been assessed with reference to the extent, magnitude and duration of effect; receptor sensitivity and compatibility with environmental policies.

Construction

Direct Impacts – Archaeology

16.9.2 Through the implementation of an appropriate mitigation strategy, agreed in consultation with the Planning Archaeologist for the South West Heritage Trust, which will allow for the excavation and preservation by record of identified archaeological assets, the reported effects on archaeological assets will be reduced as set out below:

- The **Minor Adverse Effect** on medieval/post-medieval agricultural remains will be reduced to **Negligible or No Effect**, which is not significant.
- The **Negligible to Major Adverse Effect** on potential archaeological remains from the prehistoric to Romano-British archaeological remains will be reduced to **Minor Adverse Effect** or to a **Negligible or No Effect**, which is not significant.

Direct Impacts – Built Heritage

16.9.3 There will be no residual impacts on any Built Heritage during the construction phase

Operation

Direct Impacts – Archaeology

16.9.4 There will be no further direct impacts on buried archaeological remains during operation.

Indirect Impacts – Built Heritage

16.9.5 Although screening may reduce the visual presence of the Proposed Development within the rural landscape, no measures or design choices will mitigate against the loss of the historic fields associated with the Grade II listed Manor Farmhouse. As a result, the residual effect on this asset will remain a **Minor Adverse Effect**, which is not significant.

16.10 Monitoring

16.10.1 No significant residual adverse effects have been identified for Cultural Heritage within this assessment and therefore monitoring is not required.

16.11 Summary

16.11.1 This assessment has been carried out in accordance with national and local planning policy including NPPF and the Sedgemoor District Local Plan, and industry best practice and guidelines. The methodology for the impact assessment follows the principles and guidelines set out within the Design Manual for Roads and Bridges.

16.11.2 The baseline was informed by two technical appendices (a desk-based assessment and a geophysical survey) which indicated that the Site was the location of a former Royal Ordnance Factory established in the late 1930s. Previous archaeological work carried out within the Site in support of the 2017 Planning Consent which was considered within the desk-based assessment, found archaeological remains consistent with activity from the Bronze Age, Iron Age and Romano-British period.

16.11.3 The baseline information also indicated that prior to the establishment of the ROF, the Site was located within the agricultural hinterland of the settlements of Puriton and Woolavington with some preserved evidence of medieval and post-medieval agricultural practices visible within the Site along Woolavington Road.

16.11.4 Due to the substantial known archaeological resource within the Site and the surrounding area relating to prehistoric and Romano-British remains, there is a high potential of encountering additional archaeological remains within the Site, but Outside ROF Fence.

16.11.5 The settings assessment considered the potential effects of the Proposed Development on the heritage significance of heritage assets outside of the Site boundary through a change in their setting. All assets other than the Grade I Listed Church of St Michael and the Angels, Puriton, the Grade II listed Manor Farmhouse, Puriton and the Scheduled Monument Brent Knoll and associated field system were scoped out.

16.11.6 Without mitigation, the Proposed Development has the potential to adversely affect the heritage significance of the historic environment in two ways:

- By damaging and/or removing buried archaeological remains relating to the past use of the Site; and

- By changing the setting of a heritage asset where that setting makes a contribution to its heritage significance, to such an extent that the asset loses heritage significance (or the ability to appreciate and understand that significance is diminished).

16.11.7 Through the 2017 Planning Consent, the loss of the ROF buildings through demolition and impacts to any potential below ground archaeological remains were assessed and mitigation for their loss undertaken in the form of historic building recording and archaeological excavation respectively. As a result, this chapter has assessed the potential for disturbing potential archaeological remains within the additional land included within the Proposed Development.

16.11.8 Additionally, the supporting 2013 ES, 2013 ES update and 2017 ES Addendum for the 2017 Planning Consent also determined no effects on any designated heritage assets through a change in their setting. Therefore, this assessment determined that any effects on designated heritage assets could only come through new elements of the Proposed Development.

16.11.9 Using this methodology, the assessment identified the potential for direct impacts on buried archaeological remains (i.e. loss of the archaeological resource) located within the Site which, taking a conservative approach, would lead to effects in the order of Negligible to Substantial Adverse, which, for Moderate to Substantial Adverse Effects are significant in EIA terms. Following the application of an appropriate scheme of archaeological mitigation (scope to be agreed), the residual effect of these direct impacts would be reduced to Minor Adverse Effect or to a Negligible or No Effect (which are not significant for purposes of the EIA Regulations).

16.11.10 A residual Minor Adverse Effect was identified on the Grade II listed Manor Farmhouse, Puriton, which is Not Significant, while no effects were identified on the Grade I listed Church of St Michael and the Angels or Brent Knoll Scheduled Monument. No Mitigation is proposed or considered necessary in respect of the Church and Hillfort. Whilst no specific mitigation is proposed for the Farmhouse, aside from that already covered as part of the Embedded Mitigation, sensitive design of the development in the south-west part of the Site, in line with the Design Code, will serve to soften (if not remove) the impact of development upon the heritage significance of that asset.

16.11.11 In conclusion, the Proposed Development will not have any significant adverse direct or indirect effects in respect of the heritage significance of any designated or non-designated heritage assets within or beyond the Site.

16.12 Referencing

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16.13 Non-Technical Summary

- 16.13.1 This chapter has been produced in line with Section 16 of NPPF, 2019, policies D2 and D26 in the Sedgemoor Local Plan the ClfA Standards and Guidelines to establish the potential for significant effects on heritage assets through the construction of the Proposed Development.
- 16.13.2 The majority of the Site comprises the remains of the former Royal Ordnance Factory, Puriton which was constructed in the 1930s to produce ordnance for the armed forces. Outside of the ROF fence, the Site is primarily composed of agricultural land, the character of which was formed in the medieval and post-medieval periods, and the route of a former railway.
- 16.13.3 Information gathered for the baseline, principally from previous archaeological investigations, have indicated there is a high potential for archaeological remains from the prehistoric and Romano-British periods.
- 16.13.4 The assessment established that through construction activities there is a potential for any archaeological remains within the Site to be disturbed or lost entirely. While at present the significance of these remains is unknown, the implementation of an appropriate mitigation

through preservation by record would leave a residual effect of Minor Adverse or Negligible or No Effect, which is not significance.

16.13.5 The assessment also identified a number of designated heritage assets which were sensitive receptors to the Proposed Development through a change in setting. Following a scoping exercise undertaken within the supporting Desk-based Assessment, three assets were identified as requiring further consideration as part of the assessment and included the Grade I Listed Church of St Michael and the Angels, Puriton, the Grade II listed Manor Farmhouse, Puriton and the Scheduled Monument Brent Knoll and associated field system.

16.13.6 The assessment of these assets identified that the Grade II listed Manor Farmhouse would receive a Minor Adverse Effect, which is not significant, through the loss of the agricultural fields within its immediate vicinity which contributed to its significance. No other likely significant effects were identified.