Gravity

Smart Campus

Gravity LDO Environmental Statement

Volume 2 – Appendices

Appendix 9.1 Transport Assessment

Gravity Local Development Order

Transport Assessment

Consultation Draft

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

Project Ref: 49102 | Rev: A | Date: October 2021

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Document Control Sheet

Project Name: **Gravity Local Development Order**

Project Ref: **49102**

Report Title: **Transport Assessment**

Doc Ref: **Consultation Draft**

Date: **October 2021**

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Revision	Date	Description	Prepared	Reviewed	Approved
-	11.10.21	Draft Issue to SDC	MP, DC, CM	NC, RM	SW
A	18.10.21	Consultation Draft	CM	NC	SW

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.

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Figures, Drawings & Appendices

Refer to separate Stantec TA Appendices Report

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1 Introduction

1.1 Project Background

1.1.1 This Transport Assessment (TA) has been prepared 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 . The LDO will grant a simplified, flexible planning permission capable of meeting market requirements for the Gravity Smart Campus and Community ("Proposed Development").

1.1.2 This TA has been produced in line with Planning Practice Guidance (PPG) on TAs and, as a result, demonstrates the Proposed Development impact in terms of the sustainable modes of walking, cycling, Micro Mobility and public transport, followed by the residual vehicular traffic demand. The assessment undertaken has sought to determine whether the surrounding transport network is suitable to accommodate the multi-modal transport impact generated by the Proposed Development.

1.1.3 The 261.54-hectare site is within ownership of This is Gravity Ltd and is within the administrative boundary of SDC, and the full site is a Government approved Enterprise Zone (EZ), 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 in 2017 for Huntspill Energy Park (HEP – reference number 42/13/00010 - the 'Extant Consent') has enabled the construction of a new link road (Gravity Link Road) as part of that consent, also to be completed in October/November 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.

1.1.7 LDOs create certainty for prospective occupiers and save time for those involved in the planning process, whilst ensuring that public interests such as in efficient 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 EZ to support delivery and locality transformation. The LDO responds to that commitment.

1.1.8 A Framework Travel Plan (FTP) and Environmental Statement (ES) have also been prepared by Stantec and are submitted to support the Gravity LDO, and should therefore be reviewed in conjunction with this TA.

1.1.9 This TA refers to various figures, drawings and appendices throughout. All such information is included in a separate Stantec TA Appendices Report.

1.2 Site History

1.2.1 The majority of the Site, formerly known as HEP, received planning permission for an Energy Park in November 2017.

1.2.2 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 and the Site was acquired by Gravity in 2017.

1.2.3 Since 2017, Gravity has focused on remediation of the former ROF site, construction of the Gravity Link Road and the re-imagination of the Site to facilitate a new era of clean and inclusive commercial growth which will deliver on climate action and create skilled work. This has been achieved through a review of the UN Sustainable Development Goals to re-position the regeneration of the Site.

1.2.4 Prior to determination of the HEP application, the Site secured EZ status in April 2017. The EZ became live on the 1 April 2017 and runs for 25 years until 2042.

1.2.5 The development approved by the Extant Consent was defined by a Parameters Plan. 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).

1.2.6 The safeguarded land for energy uses do not align with an approach to reduce carbon emissions and therefore have a proactive approach on climate action. There is no certainty in the delivery of outcomes relating to land safeguarded for energy, leisure and rail restoration as no specific consent was granted for those elements of the scheme.

1.2.7 The uses approved the Extant Consent are set out below:

a. 8.78 ha of B1 (max 32,150 sqm)

b. 14.84 ha of B2 (max 43,600 sqm)

c. 30.45 ha of B2 (max 101,310 sqm)

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

1.2.8 The transport assessment work undertaken in relation to the Extant Consent and approved by the authorities are principally as follows:

- PBA Huntspill Energy Park Transport Assessment, April 2013
- PBA Huntspill Energy Park Supplementary Transport Assessment – Local Road Network, October 2013
- PBA Huntspill Energy Park Supplementary Transport Assessment – Strategic Road Network, September 2013
- PBA Huntspill Energy Park Travel Plan Framework, Rev 05, March 2017

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1.2.9 The vehicle trip generation for the HEP scheme, as assessed under application reference 42/13/00010 relating to the Extant Consent, is as shown in **Table 1-1**. Whilst energy generating uses were assessed for robustness in the HEP TA, the trips associated with such uses have been removed from the table below. This has been undertaken because the safeguarded energy land uses did not form part of the final planning approval.

Land Use	AM Arr Trips	AM Dep Trips	AM Tot Trips	PM Arr Trips	PM Dep Trips	PM Tot Trips
B1a	193	32	225	33	176	208
B1b	68	6	74	7	54	61
B1c	79	37	116	14	54	69
B2	322	149	471	58	221	279
B8	259	221	481	238	330	568
Total	**922**	**445**	**1,367**	**350**	**836**	**1,186**

Table 1-1 Weekday AM and PM peak vehicle trip generation for Extant Consent excluding safeguard land uses

1.2.10 **Table 1-1** equates to a total of 1,367 two-way vehicle movements generated in the AM peak period, and a further 1,186 two-way vehicle movements in the PM peak period for the HEP scheme.

1.2.11 It has been agreed through the Extant Consent that the traffic generation set out above could be accommodated on the local and strategic road network provided that the following transport commitments are delivered.

- Gravity Link Road scheme including the new site access proposals and the Green Bridge.
- Improvements to the A39 / Hillside and A39 / Hall Road junctions (forming part of the above scheme).
- Puriton and Woolavington Village Enhancement Schemes (VES) providing a series of agreed highway, walking and cycling improvements to enable better accessibility to the site.
- Travel plan obligations (approach being framed as part of the discharge process for the existing consent to enable and encourage early potential investors / first movers).
- A38 Dunball Roundabout upgrade or a contribution toward, up to a maximum sum of £850,000 (based on agreed defined trigger points linked to the occupation of B1, B2, B8 use floorspace).
- M5 Junction 23 partial signalisation or a contribution toward with occupation of B1, B2, B8 use floorspace limited as per agreed defined trigger points.
- Financial contribution toward local authority delivery of the Local Transport Infrastructure Delivery Fund to help bring forward transport improvements across the locality.

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1.2.12 A few buildings, including some 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 as submitted to support the LDO.

1.2.13 The majority of demolition and remediation works at the Site were completed in November 2020.

1.2.14 Various elements of the Extant Consent have also been implemented as follows:

- The new road access onto the A39, referred to as the Gravity Link Road. Construction of the road, along with some other changes to the A39 Hall Road and A39 Hillside junctions, is scheduled to open in October/November 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 VES, an obligation within the Section 106 agreement, has achieved planning consent and is passing through the technical approval process with Somerset County Council (SCC) 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.
- 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 other site wide conditions. At the time of writing this TA, 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

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- Condition 35 – Foul Drainage
- Condition 36 – Strategic Landscape Masterplan

1.2.15 In addition, partial signalisation works to Junction 23 of the M5 have been completed by other parties The improvement works completed removes the need for the Extant Consent to improve Junction 23 in line with the Section 106 obligation, and the capacity of the junction has been increased in anticipation of the additional traffic that could be generated by the HEP scheme. Contributions have also been made by This is Gravity Ltd to advanced transport modelling and assessment work.

1.3 Transport Assessment Approach

1.3.1 This TA has been prepared within the context that there is a growing evidence base demonstrating a shift in travel behaviour because of disruptive technological and societal changes, in particular amongst the younger generations for whom a significant part of future development demand applies.

1.3.2 There is widespread evidence demonstrating that there is less reliance on the car from younger generations, aspiration to socialise or work while travelling, high costs of car ownership and change in priorities of spend (car not being a status symbol) all leading to a consensus that future travel behaviour will lead to lower levels of private car use. **Chapter 4** of this report provides further details on these trends.

1.3.3 In addition, there are six 'game changers' that could further change the way we travel in the future. These are:

- Big data – the digital revolution has bought us so much data that it is possible to plan better for people's needs. The opportunities are vast.
- Internet of things – this is about connecting devices over the internet, with the roll-out of 5G, letting them talk to us, applications, and each other, allowing the travel industry to track people and vehicles to reduce the need to travel or co-ordinate seamless travel.
- Connected vehicles – a system that allows vehicles to communicate with each other and the world around them, connecting them to the Internet of Things. It supplies information to allow drivers to make informed decisions about their travel.
- The sharing economy – we are sharing cars, taxis, lifts, driveways, houses, tools and many more things. This could change when and how we travel, and whether we do it together.
- Mobility as a Service – (MaaS) will offer consumers access to a range of vehicle types and journey experiences. It is a digital interface to source and manage the provision of transport related services. Basically, it's a contract for travel, similar to a mobile phone contract – pay as you go, monthly or annually for different levels of service. An app would allow you to select your travel choice. Alerts and information will guide you on your journey to your destination, giving real-time information, on where and when to get each means of travel.
- Driverless vehicles – these already exist and are being trialled by many manufacturers. The UK has one of the best regulatory regimes for testing automated vehicles in the world, therefore providing a good platform for developments in this industry.

1.3.4 PBA's 'All Change' document (which can be provided upon request) explains that the approach to travel planning needs to take account of all the highlighted changes set out above. Our transport networks need to be resilient and able to adapt to the changes the future could bring. This means that new developments need to be designed for the future too, to influence travel with investments developed and prioritised to support and encourage sustainable travel in line with the DfT's user hierarchy where pedestrians, cyclists and public transport users are considered before other motorised traffic.

1.3.5 Furthermore, advances in vehicle technologies such as electric vehicles and autonomous vehicles create opportunities to rethink established means of delivering transport in an urban environment.

1.3.6 Development in mobile technology also creates a new realm of possibility when considering how the built environment is designed and how people use it. Increased internet access allows people to work in more 'agile' ways, where 'work' is not a place you go to but more something you do.

1.3.7 This research, in combination with many other evidence bases, is therefore questioning the validity of traditional 'Predict and Provide' transport appraisal assumptions in forecasting future travel demands and traffic levels. Despite the end of the 'Predict and Provide' approach for planning the transport effects of land use development being signalled in PPG13 in 1994, often, practice on the ground still looks like a 'Predict and Provide' approach, in which demand for future traffic growth is forecast and, where possible, provided for.

1.3.8 The DfT transport planning hierarchy does encourage proper assessment of sustainable modes before planning for residual traffic growth, and this is a step forward – but this analysis is included in an otherwise very much 'business as usual' transport assessment environment.

1.3.9 'Monitor and Manage' techniques have been employed in a limited way in order to encourage investment in new highway capacity only when necessary, as determined by intermediary evidence. Whilst this has been a step forward, what is really needed now is to adopt a 'Vision and Validate' approach to transport planning in which we seek to envisage the places we want to create, and to use our transport and land use planning skills to plan ways of getting there, taking into account the current disruptive changes now taking place.

1.3.10 This report presents a 'Vision and Validate' assessment which considers the potential future operational performance of the road network, moving away from the increasingly inaccurate traditional 'Predict and Provide' assessment approach and taking into account travel trends evidence, the capacity for the existing network to accommodate future growth, and wider transport interventions encouraging sustainable travel.

1.3.11 The transport strategy outlined in this TA has been developed using a bespoke Scenario Testing tool, that has enabled the running of a wide range of scenarios and to demonstrate that there are a number of different sustainable futures that would be considered as 'Preferred Futures' for the development and operation of the Gravity development.

1.3.12 These measures would ensure that the site is highly accessible by alternative modes of transport to the private car and therefore improve the sustainable nature of the development. The assessment also determines whether the surrounding transport network could accommodate the person trips generated by the proposed development rather than simply planning for historical trends in car use.

1.3.13 This TA should be reviewed alongside the bespoke Framework Travel Plan (FTP) for the site that has been prepared as a separate document to support the LDO. The FTP aims to reduce the environmental impact of the development proposals by minimising the number of single occupancy vehicle trips and encouraging users of the site to travel by more sustainable alternative modes.

1.3.14 Future LDO Compliance Applications will need to demonstrate conformity with the findings of this TA and the proposed Mitigation Measures as incorporated into the LDO Mitigation Checklist.

1.4 Scoping Consultation

1.4.1 Comprehensive transport scoping discussions have been undertaken with various stakeholders through a Gravity LDO Transport Working Sub Group where regular meetings and workshops have taken place since November 2020.

1.4.2 The Gravity LDO Transport Working Sub Group comprises of appropriate members representing a range of different stakeholders including:

- Somerset County Council (SCC)
- National Highways (NH)
- Sedgemoor District Council (SDC)
- Heart of the South West Local Enterprise Partnership
- Network Rail (NR)
- Arup representing Sedgemoor District Council
- WSP representing Somerset County Council
- Womble Bond Dickinson
- This Is Gravity Ltd
- Stantec UK Ltd

1.4.3 The purpose of the sub-group has been to provide regular project updates as part of an extensive pre-application consultation exercise discussing emerging plans and assessment methods, to understand the key deliverables and discuss mobility strategies for the site.

1.4.4 A Transport Assessment Scoping Report (included as **Appendix D**) was prepared in November 2020 and explained the main principles of the transport strategy supporting Gravity, and demonstrated how the scheme would be assessed in terms of its multi modal transport impact on the surrounding highway network. The Scoping Report was issued to all Sub Group members for review and they did not raise any fundamental concern over the approach that was presented.

1.4.5 The content of the Scoping Report was progressed in more detail in collaboration with the authorities through a series of technical workshops, and the issuing of technical notes and spreadsheets for review. Feedback was discussed at the Sub Group meetings and anything deemed appropriate or necessary was incorporated or addressed.

1.4.6 The content of this TA follows a Vision and Validate approach which has been produced pursuant to the discussions and technical analysis that was submitted to and reviewed by the various authorities at the scoping stage.

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1.5 Purpose of the Transport Assessment

1.5.1 Given the nature of an LDO, there remains significant uncertainty on the final scheme details and end occupier(s). The purpose of this TA is therefore to:

- Provide an indication of the potential scale of transport impact against which future compliance applications can be assessed.
- Outline a package of measures that are likely to be implemented, although the final details of which will inevitably need to be tailored to end occupiers as part of future LDO Compliance Applications.
- Demonstrate that managing travel demand by maximising sustainable travel options at this site is embedded within the site design (see LDO Design Guide prepared under separate cover) and development approach.
- Propose a Monitor and Manage approach (see Chapter 9) which will track multi modal trips to inform future adjustments to the investment in sustainable modes whilst also tracking peak period vehicle trip generation to provide SCC / NH assurances regarding the peak period operational performance on the highway network.

1.6 Report Structure

1.6.1 This report is structured as follows:

- Chapter 2 – Reviews the existing transport conditions around the site including the local highway network, existing pedestrian, cycling, and public transport facilities. It also includes a review of highway safety for a defined study area surrounding the site.
- Chapter 3 – Sets the context of the proposed development in relation to local and national planning and transport policy / guidance.
- Chapter 4 – Provides further information and evidence on emerging future travel trends.
- Chapter 5 – Explains the principles of the Gravity Transport Strategy and the assessment approach.
- Chapter 6 – Outlines the scope and scale of the Proposed Development, provides details on the vision and ambitions for the Site, and sets out the package of transport measures proposed.
- Chapter 7 – Explains the transport appraisal methodology adopted to assess the multi modal transport impact of the Proposed Development.
- Chapter 8 - Sets out the forecast vehicle impact of the Proposed Development on the highway network through junction capacity assessments.
- Chapter 9 - Sets out the proposed package of mitigation measures and how they are expected to be secured through future LDO Compliance Applications including opportunities for investment in transport improvements through the draft LDO Locality Investment Plan.
- Chapter 10 – Provides an overall summary and conclusion to the report.

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2 Baseline Transport Conditions

2.1 Introduction

2.1.1 This chapter provides a description of the site location which is also shown in **Appendix A - Figure 1**, a review of local facilities and the existing pedestrian, cycle and public transport facilities and services in the immediate area, and a review of the local and strategic highway network in terms of its operation and safety record.

2.1.2 In addition, this chapter also provides a summary of the baseline transport data used to understand the existing operation of the local highway network surrounding the site.

2.1.3 This chapter refers to various figures, drawings and appendices. As stated previously, all such information is included in a separate Stantec TA Appendices Report.

2.2 Site Access

2.2.1 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.

2.2.2 Both Woolavington Road and the B3139 Causeway in the vicinity of the site are rural in character and considered sub-standard in part along its length in terms of general alignment, forward visibility and highway capacity. To this end the current access arrangements were not considered suitable to provide the main strategic access to support the Extant Consent.

2.2.3 As such, the Extant Consent included the construction of a new link road and junctions linking the development to the A39 Puriton Hill, whilst also providing direct access to the M5 motorway via Junction 23 and the A38 via Dunball Roundabout. A general arrangement drawing of the Gravity Link Road scheme is provided in **Appendix E**.

2.2.4 Therefore, several transport related elements of the Extant Consent in relation to access are scheduled to be completed in October/November 2021:

- 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) (public footpath BW 28/2 which is being retained).

2.2.5 Whilst the primary 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.

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- Improved connectivity, accessibility and general safety for pedestrians and cyclists and public transport users.

2.2.6 In addition to delivery of the Gravity Link Road, an improvement of Junction 23 of the M5 to provide increased traffic capacity has been completed and enhanced beyond what was required for the Extant Consent. Further details on the completed work is provided later in this report.

2.3 Local Facilities

2.3.1 Within the immediate vicinity of Gravity are 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 both 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.

2.3.2 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.

2.3.3 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.

2.3.4 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.

2.3.5 Note that the Gravity Campus itself will provide a range of services and amenities on site, catering for both employees, residents and visitors alike.

2.3.6 **Appendix A - Figure 2** provides an overview of the local facilities surrounding the site and identifies key parts of the local road network.

2.4 Walking and Cycling

2.4.1 **Appendix A - Figure 3** provides an overview of the existing walking and cycling networks surrounding the site.

2.4.2 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.

2.4.3 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 (VES) to be delivered as part of the Extant Consent (discussed below) will help to address some of these local connectivity issues within and between the two villages.

2.4.4 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.

2.4.5 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.

2.4.6 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.

2.4.7 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

2.4.8 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.

2.4.9 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.

2.4.10 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.

2.4.11 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

2.4.12 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.

2.4.13 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.

2.4.14 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.

2.4.15 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 Overview

2.4.16 The Section 106 Agreement for the Extant 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.

2.4.17 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 Extant 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).

2.4.18 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.

2.4.19 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.

2.4.20 A summary of the VES proposals is set out below for both Puriton and Woolavington villages.

Village Enhancement Scheme – Puriton Proposals

Puriton Hill / Hall Road

- As part of the Gravity Link Road scheme, there is a change in priority from Hall Road to Old Puriton Hill. This introduces a speed reduction measure and will encourage slower vehicle speeds. Hall Road will be enhanced to a northbound one-way layout with on-street parking and a deflection island.
- Tightened radii at the junction between Puriton Hill / Hall Road (on the western side of Hall Road) and an overrun area provided to reduce vehicle speeds and reduce pedestrian crossing time.

Hall Road / Riverton Road

- As part of the Gravity Link Road scheme, there is a change in priority from Hall Road to Old Puriton Hill.
- The Taylor Wimpey development on Green Acres has provided tightened geometry via a speed control bend, which will encourage lower speeds to the north.

Riverton Road

- In order to maintain low vehicle speeds and provide regular spacing of traffic calming measures on a bus route, speed cushions have been proposed at regular intervals.

Riverton Road / Newlyn Crescent / Rowlands Rise

- A raised table junction with tightened junction kerbing and crossings is proposed to accommodate the desire lines and promote pedestrian movement to Puriton Primary School and local centre. These proposals also fulfil need for the regular spacing of traffic calming measures to maintain low vehicle speeds.

Riverton Road / Woolavington Road

- A change to the surface colour is proposed on the 'S' bend to the east of Puriton local centre to alert drivers of potential hazards. A review was undertaken to provide a crossing in this location to accommodate desire lines to the local centre. However, due to existing levels and third-party land constraints, there is no opportunity to provide a safe crossing point.

- The footway on the eastern side of Woolavington Road will be widened to 1.8 metres to increase accessibility to the local centre. Minimum carriageway and footway width will be maintained as part of proposals.

Hillside / Woolavington Road

- A raised table junction with crossings is proposed to encourage slower vehicle speeds and accommodate observed desire lines to Puriton Primary School and local centre.

- Traffic calming measures to the east on the bend along Woolavington Road have not been proposed as such measures would displace existing on-street parking.

Hillside / Cypress Drive

- A raised table junction is proposed between Hillside and Cypress Drive to encourage slower vehicle speeds on approach to Puriton Village and the connection to the Gravity Link Road.

Woolavington Road

- A raised table is proposed to the west of Manse Lane and proposed H-Bar markings to discourage parking on or adjacent to existing crossing, which will undergo refurbishments.

- A 3.5m pinch point is proposed to the east of Manse Lane, with priority control, incorporating crossing and widened footways, narrowing the carriageway to a single lane. Proposed give way road markings to the west form a priority control, which encourages slower speeds for eastbound traffic.

- The build out with a crossing to the east of Manse Lane is to be maintained to increase accessibility and encourage slower vehicle speeds.

- The existing bus stop is to be relocated further west to improve bus vehicle movement travelling east after the proposed pinch point, subject to discussions with Travel Somerset and bus companies.

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- The existing flat top road hump located to the east of Spring Rise is to remain, which provides a connection to the footway along the northern side of Woolavington Road and encourages slower vehicle speeds.

- To the east of Puriton, speed cushions are proposed to the east of Canns Lane to encourage lower vehicle speeds and a raised table to the east of Puriton Park accommodates pedestrian movement and slows vehicle speeds westbound entering the village. Reduced bellmouth kerb radii at Puriton Park also encourages reduced vehicle speeds and reduces pedestrian crossing distance.

- A new footway will be provided to form a pedestrian link to Woolavington with the width ranging between 1.2 metres to 2 metres. The proposed footway will connect into shared foot/cycleway currently being constructed as part of Gravity access road works.

- Improvements to existing Puriton Gateway and a new 'slow' marking are proposed on the eastern entrance to the village.

Village Enhancement Scheme – Woolavington Proposals

Woolavington Road Gateway

- A new 'slow' marking is proposed to encourage slower speeds on the approach to Woolavington and an improvement to the existing Woolavington village entrance gateway with the change of speed limit signage is to be refreshed.

- A 3-metre shared foot / cycleway is proposed to link to Woolavington Road with cycle transition at the peak point of visibility on the north of the carriageway. Approximately 80m of hedgerow will be removed to accommodate footway / cycleway access and visibility splays.

- A built-out crossing and footway is proposed to link to existing public right of way and proposed shared footway / cycleway. The crossing point reduces the carriageway width and give way road markings to the west form a priority control, which encourages slower speeds and enables accessibility to Crancombe Lane and the wider Public Right of Way network.

Higher Road / Woolavington Village Primary School

- A flat top road hump is proposed to the west of the entrance to Woolavington Village Primary School to encourage slower vehicle speeds on approach to the school and promote use of the existing informal crossing points.

- A footway is proposed across the front of Woolavington Village Primary School, which include new crossing points with tactile paving.

- A raised table junction with crossings is proposed to the east of Woolavington Village Primary School between Higher Road and The Drive. This proposal accommodates observed desire lines to the school and will encourage slower vehicle speeds on approach to the school.

- Speed cushions are proposed to the east of Crancombe Lane adjacent to The Green to the west of existing bus stops to lower vehicle speeds through the regular spacing of traffic calming measures.

Higher Road / Causeway / Vicarage Road / Woolavington Hill

- To accommodate desire lines over The Green a new footpath is proposed, subject to land ownership.

- The existing zebra crossing on Woolavington Hill will be incorporated into a flat top road hump to encourage slower vehicle speeds.
- Speed cushions are proposed to maintain existing low vehicle speeds and provide regular spacing of traffic calming measures along Causeway to the north of the junction.
- Chicane barriers are proposed on the footway to the western side of the carriageway, along with improved crossing facilities providing access to the existing bus stop, which will have new bus cage markings and high access kerbs.

B3141 Causeway

- The existing Woolavington Gateway and is to be refreshed as part of proposals associated with the change of speed limit are to be refreshed and improved as part of proposals.
- Speed cushions are proposed south of the gateway and existing speed limit road markings along Causeway on the northern edges of the village will be refreshed and improved to reduce and maintain low speeds and provide regular spacing of traffic calming measures.

Causeway / Lower Road / Church Street / Lockswell

- A flat top road hump is proposed incorporating an existing crossing to the north of Causeway / Lower Road junction, which is to encourage slower vehicle speeds and accommodate desire lines.
- Contrasting surface colour treatment could be introduced to Causeway's intersections between Lower Road, Church Street and Lockswell.
- Improved informal crossing facilities are proposed across Church Street and a new crossing provided along Lockswell
- A new section of footway is proposed to connect the existing footway north of Church Street to the existing footway along Lockswell.
- Speed cushions are proposed to the south of the proposed surface treatment area along Lockswell.

Woolavington Hill

- Existing build outs will be refreshed to improve awareness as part of proposals.
- Speed cushions are proposed to the north of the northern access of Old Mill Road.
- Old Mill Road northern junction radius will be tightened and include improved crossing facilities. A flat top road hump is also proposed on the southern side of the junction, which incorporates the existing crossing.
- Between the northern and southern access points of Old Mill Road, two new sets of additional speed cushions and the refreshment of a second existing build out are proposed.
- The Old Mill Road southern junction radius will be tightened and include improved crossing facilities. A flat top road hump is also proposed on the southern side of the junction, which incorporates the current crossing.

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- Speed cushions are proposed further south of the Old Mill Road and Woolavington Hill junction.
- The southern Woolavington gateway feature will be improved and refreshed as well as the existing rumble strips on the entrance and exit of the village.

Village Enhancement Scheme – Shared foot/cycleway between Puriton and Woolavington

2.4.21 As part of the VES scheme proposals, a shared use foot/cycleway is also proposed between the villages of Puriton and Woolavington.

2.4.22 The proposed footway will tie into the Gravity Link Road at the Woolavington Road roundabout. Concrete steps with wooden handrails will provide a link to the access road with a new pedestrian crossing to the north of Woolavington Road roundabout.

2.4.23 The 3.5 metre foot/cycleway becomes a segregated route to the east of the roundabout before running to the north of the 37 Club and joining the existing entrance to the ROF site.

2.4.24 The route will run on the field side of the hedge to the east of the existing access, on land entirely within Gravity ownership. To the east of the ROF entrance the foot/cycleway route mirrors the eastern approach road before running parallel to Woolavington Road, adjoining the road at the western gateway of Woolavington.

2.4.25 Where the shared foot / cycleway meets the carriageway, the removal of vegetation and the location of the exit point on the bend is designed to accommodate maximum visibility splays for pedestrians and cyclists.

2.4.26 Further details of the VES are illustrated in drawings included in **Appendix F**.

2.5 Public Transport

2.5.1 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 at some stage.

2.5.2 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 2-1**.

2.5.3 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.

2.5.4 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 2-1 Local Bus Services

2.5.5 A wider range of bus services are available from Bridgwater Bus Station, which is accessed off Watsons Lane in central Bridgwater. **Table 2-2** 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 2-2 Bridgwater Bus Station Departures

2.5.6 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.

2.5.7 The Site is situated east of the mainline railway between Highbridge & Burnham and Bridgwater stations, and Gravity has an aspiration to connect the site with the railway by the reinstatement of a spur which was removed in the 1990's to facilitate both passenger and rail freight services. NR has confirmed that reopening of the spur would be feasible.

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2.5.8 The closest operational 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.

2.5.9 The locations of existing bus stops close to the site, and Bridgwater rail and bus stations, are all shown in **Appendix A - Figure 2.**

2.6 Highway Network

2.6.1 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.

2.6.2 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.

2.6.3 M5 Junction 23 has been modified and upgraded to signal control through the mitigation agreed for the Hinkley C project to create additional capacity. The improvement works completed removes the need for the Extant Scheme to improve M5 Junction 23 in line with the Section 106 obligation, and the capacity of the junction has already been increased in anticipation of the additional traffic that could be generated by the extant consent.

2.6.4 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.

2.6.5 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.

2.6.6 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.

2.6.7 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.

2.6.8 At the time of writing this TA, there are temporary highway works present on Woolavington Road which may include periodic temporary traffic light control at a location between the existing Eastern Approach access and Woolavington village. These are in place to allow short-term strategic improvements to electricity overhead cables to be carried out.

2.6.9 **Appendix A - Figure 4** illustrates the strategic site context in terms of surrounding settlements and highway links. **Appendix A - Figure 2** illustrates the local site context including key parts of the local road network.

Personal Injury Collision Analysis

2.6.10 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.

2.6.11 Data provided by the 'Crashmap' website has also been considered in relation to the Junction 23 slip roads. The findings for both the local and strategic road networks are set out below.

2.6.12 The original PIC data records with associated scatterplots are provided in **Appendix G**.

Local Road Network

2.6.1 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 2-3** 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 2-3 Personal Injury Collision (PIC) Data Summary (Local Road Network)

2.6.2 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 causalities. 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.

2.6.3 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 causalities were recorded.

2.6.4 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 prioritised for improvement by SDC and SCC.

Strategic Road Network

2.6.5 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.

2.6.6 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.

2.7 Baseline Data

2.7.1 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.

2.7.2 Furthermore, 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).

2.7.3 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. The following data has been sourced:

- 2018 junction turning counts and queue lengths 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 Extant Consent
- Extensive Automatic Traffic Counter data (2018)
- Traffic data supporting the Puriton and Woolavington approved VES and Extant Consent documentation
- NH's Webtris traffic database
- Committed development Transport Assessments for trip generation, distribution and base count data

2.7.4 Traffic flows for the 2018 base year are shown in **Appendix B - TF1a/b** and **TF2a/b**.

2.8 Summary

2.8.1 This section has demonstrated that excellent progress has been made through the part implementation of the Extant Consent and the completed upgrade of M5 Junction 23. SDC has also safeguarded funding for the planned upgrade of the A38 Dunball Roundabout and the improvement scheme is currently being reviewed.

2.8.2 As stated previously, several transport related elements of the Extant Consent in relation to access are scheduled to be completed and opened in October/November 2021:

- 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 PROW.

2.8.3 Whilst the primary function of the Gravity Link Road is to provide a strategic access to the Site, it will also provide a range of 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.

2.8.4 Furthermore, the VES is scheduled to be delivered following the Gravity Link Road, and will 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.

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3 Review of Transport and Planning Policy and Guidance

3.1 Introduction

3.1.1 Stantec appreciates that the transportation elements of the LDO need to be undertaken in a consistent manner to take account of the other development proposals, policy background, and the strategy for development within Sedgemoor district and Somerset county. It is therefore important that the development generally accords with all appropriate national and local transport policy. Policy and guidance documents relevant to this site are outlined and reviewed in this chapter.

3.2 National Planning Policy and Guidance

National Planning Policy Framework (2021)

3.2.1 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*").

3.2.2 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."*

3.2.3 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.*"

3.2.4 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".*

3.2.5 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

3.2.6 The National Planning Practice Guidance[1] (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).

3.2.7 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)'.*

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

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

National Design Guide, 2021

3.2.9 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.

3.2.10 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*".

3.2.11 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.

3.2.12 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 measures by how they contribute to the quality and character of the place, not only how well they function*".

3.2.13 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."*

3.2.14 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*'.

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Decarbonising Transport, A Better Greener Britain, 2021

3.2.15 The Department for Transport (DfT) published 'Decarbonising Transport, A Better Greener Britain' in 2021.

3.2.16 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.

3.2.17 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.

3.2.18 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.

3.2.19 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

3.2.20 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.

3.2.21 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.

3.2.22 The DfT published Bus Back Better, National Bus Strategy for England in 2021.

3.2.23 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.

3.2.24 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'.*

3.2.25 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

3.2.26 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.

3.2.27 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

3.2.28 The BSIP will be submitted by SCC to the DfT in October 2021 with a view to achieving agreement and completion by April 2022.

3.3 Local Policy

Sedgemoor Local Plan 2011 – 2032

3.3.1 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.

3.3.2 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.*"

3.3.3 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.

3.3.4 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."

3.3.5 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".*

3.3.6 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."*

3.3.7 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;*

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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

3.3.8 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.

3.3.9 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.

3.3.10 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."*

3.3.11 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

3.3.1 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.

3.3.2 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.

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Refreshed Bridgwater Vision, 2015

3.3.3 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.

3.3.4 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, 2012

3.3.5 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.

3.3.6 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.

3.3.7 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.

3.4 Summary

3.4.1 A full review has been undertaken to identify the national and local transport and planning policies and guidance that are most applicable to the Proposed Development. It is concluded that Gravity is in full alignment with planning for sustainable development, and thus the objectives of current national and local transport policy.

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4 Emerging Evidence on Future Travel Trends

4.1 Introduction

4.1.1 There is a growing evidence base demonstrating a shift in travel behaviour as a consequence of disruptive technological and societal changes, in particular amongst the younger generations for whom a significant part of future development demand applies.

4.1.2 There is widespread evidence demonstrating that there is less reliance on the car from younger generations, aspiration to socialise or work while travelling, high costs of car ownership and change in priorities of spend (car not being a status symbol) all leading to a consensus that future travel behaviour will lead to lower levels of private car use.

4.1.3 This chapter provides an overview of a selection of key evidence documents that are underpinning these trends, including:

- Understanding the drivers of road travel: current trends in and factors behind road use (DfT, Jan 2015).
- Provision of Travel Trends Analysis and Forecasting Model Research (Atkins, AECOM and Imperial College London (2017).
- Young People's Travel – What's Changed and Why? Review and Analysis: Report to DfT (UWE, 2018).
- Research undertaken by Devon County Council and presented to the DfT (2018).
- A Time of Unprecedented Change in the Transport System, The Future of Mobility (Government Office for Science, January 2019).

Understanding the drivers of road travel: current trends in and factors behind road use (DfT, Jan 2015)

4.1.4 DfT research suggests that "*over recent decades growth in road traffic has been slowing*", and additionally indicates that "*car traffic has shown the greatest growth over the long-run but national levels are currently at the levels seen in 2002.*"

4.1.5 As part of the 2015 report, the DfT have considered multiple factors affecting car use. Some of these include:

- Younger people not learning to drive due to the high cost of learning and car insurance, leading to a decline in car use in this demographic (based on NTS data)';
- Employment rates; a fall in 'real income' amongst younger people over the last decade has made driving cost-prohibitive, whilst employments rates among "females and older age groups", who are driving more, has increased;
- Traffic levels are shown to track and 'mirror' the changes in Gross Domestic Product;
- Declines in company car use have been found to account for the largest reduction in mileage amongst men between the ages of 30 and 60 and may also be linked with the decline of car use in London. DfT link this to changes in company car taxation rules;
- Urbanisation and increases in population density have been found to have brought down car demand in recent decades; and

- There is evidence to suggest that "increasing congestion in urban areas is contributing to the levelling of traffic in these areas, and that more people in these areas are travelling by public transport".

4.1.6 The report suggests also that "we may expect traffic in urban areas to grow less strongly, as… the availability of public transport services [keeps] traffic growth down, alongside more limited road capacity", and it additionally suggests that "public transport might be expected to continue becoming an increasingly important feature in these areas, whilst greater support and access to cycling… may encourage people to travel by other modes".

Provision of Travel Trends Analysis and Forecasting Model Research (Atkins, AECOM and Imperial College London (2017)

4.1.7 The report, which aimed to develop a forecasting model using statistical relationships identified in travel trends and drivers, cites evidence which suggests that:

- "Average trip rates have decreased between 1988 and 2010 for the majority of trip purposes", including commuting and leisure, and suggested that based on their analysis, it is "changes in walking trips and short trips… [which] have made a significant contribution to the overall observed trends in trip rates";
- Trip rates amongst all age groups except the 65+ age group have decreased, whilst the 65+ age group has increased only "slightly";
- Whilst annual car mileage has increased more amongst females and older age groups, there has been "a decline in distance travelled by car… predominantly [seen] amongst the young people and men"; and
- A comparison of 2001 and 2011 Census data has shown that "the proportions of workers categorised as 'working mainly at or from home' has increased by 1.4 percentage points to 10.6% in 2011".

4.1.8 The report therefore suggests that:

- "…reasons for changes in mobility patterns include the differential costs of motor insurance as well as learning to drive, which disproportionately accrue to younger age groups", which may have in impact on the number of people choosing to drive or own a car;
- "…an increase in the number of individuals who work from home regularly is linked to a reduction in the number of commuting trips made" and it is hypothesised that "using online social networks and online gaming substitute social travel to some extent", and;
- The overall decline in average trip rates may be mostly due to "changes in walking trips and short trips".

Research undertaken by Devon County Council and presented to the DfT (2018)

4.1.9 The DCC research suggests that the link between traffic growth and economic growth has been broken, and that there are significant changes amongst younger people whose propensity to travel by car has fallen, in men by some 47%. Whilst the older generation are generally travelling by car a little more, the trends amongst younger people away from the car might have very significant implications for future transport provision.

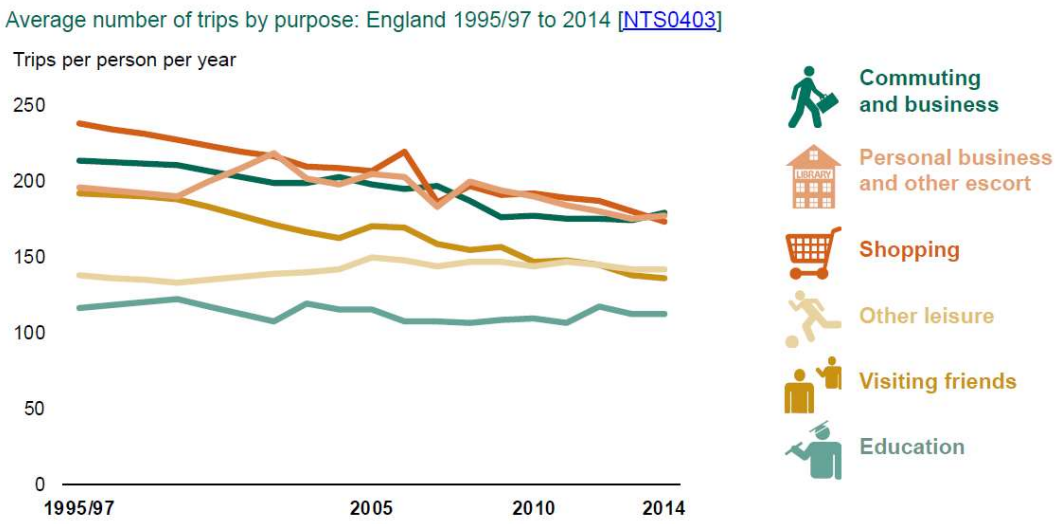

Figure 4-1 Average number of trips by purpose: England 1995/97 to 2014 (NTS)

4.1.10 The above research is therefore questioning the validity of current transport appraisal assumptions in forecasting future travel demands and traffic levels.

4.1.11 The research considers that there is a need to move away from the increasingly discredited traditional assessment approach by taking into account travel trends evidence, the capacity for the existing network to accommodate future growth, and wider transport interventions forming part of the JLP Transport Strategy. The anticipated outcome is that future traffic levels will be significantly lower than that forecast across the network using traditional approaches.

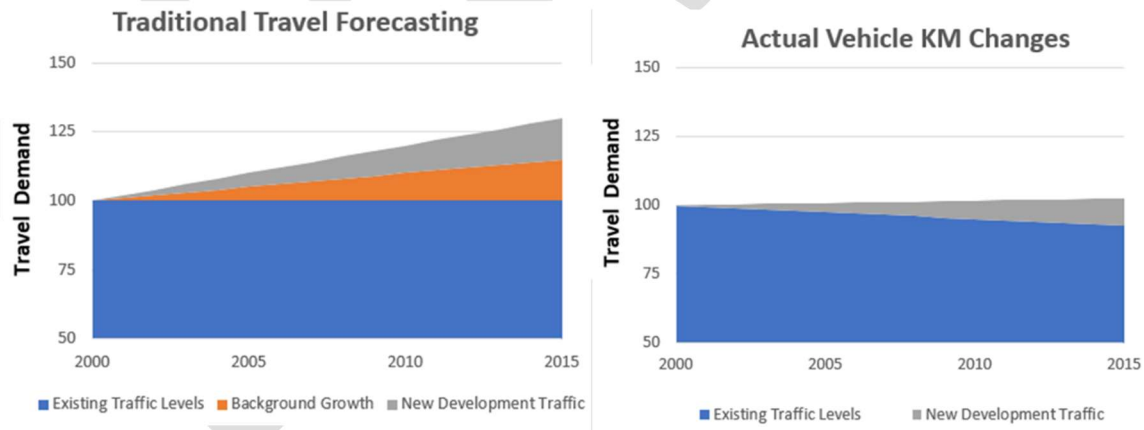

Figure 4-2 Traditional Travel Forecasting v Actual Vehicle KM Changes (Source: DCC, 2018)

Young People's Travel – What's Changed and Why? Review and Analysis: Report to DfT (UWE, 2018)

4.1.12 Research undertaken by the Centre for Transport & Society (UWE and University of Oxford) found that "*young adults* [ages 17-29] *in Great Britain and other countries are driving less now than young adults did in the early 1990s*", and that this change began approximately 25 years ago.

4.1.13 This is evidenced in that as of 2014, only 29% of 17-20 year olds and 63% of 21-29 year olds held a driving licence, representing a 19% and 12% decrease respectively. Additionally, it is

cited that "*between 1995-99 and 2010-14 there was a 36% drop in the number of car driver trips per person made by people aged 17-29*".

4.1.14 The causes behind this change are hypothesised to be the prohibitive cost of motoring amongst younger people (linked in also with the "*stagnation in wage rates*" and decline in disposable income) as well as younger people accepting not driving, or their peers not driving, as evidenced by surveys and interviews.

4.1.15 Additionally, these decreases are linked to increases in "*time spent at home*", more young people are living in urbanised areas with public transport having a "*greater impact" on commuting choice*", and increased enrolment in higher education which may delay when younger people choose to own a car.

4.1.16 The report also suggests that whilst evidence of the impact of technology on travel behaviour is "*contradictory*", it remains a "*a plausible contributor to the fall in total travel by young people*" as well as changes to signifiers and understandings of 'adulthood'.

A Time of Unprecedented Change in the Transport System, The Future of Mobility (Government Office for Science, January 2019)

4.1.17 The report notes that "*we are currently travelling less at an individual level*", with a greater shift away from use of the private car amongst young people linked in part to changing economic situations, choices of where people live, and a "*greater openness to the sharing economy, which new technology will increasingly facilitate*".

4.1.18 Additionally, the report confirms that the different modes of transport are "*deeply interrelated: the increasing use of one often leads to a reduction in another*". Whilst it does add that "*the relationship…* [can] *be complementary*", it can be inferred that a shift towards more sustainable modes of transport to fulfil trip purposes (the most common of which are cited to be commuting and shopping) will in turn lead to a shift away from the private car.

4.1.19 The report therefore advocates for transport to be considered as a system, as well as "*exploring different futures, identify*[ing] *opportunities and help*[ing to] *mitigate the unintended consequences of new transport modes, technologies and/or trends*", and concludes that:

"*transport needs to be considered as a holistic system, not as sequential or separate elements. The 'predict and provide' principle that guided transport planning between the 1950s and 1990s tended to treat modes separately, but this will no longer suffice*".

4.1.20 The report states that "*there has been a general decrease in both trips and mileage (per person) for personal transport in rural, semi-urban and urban areas*", evidenced by a 12% decrease in car trips and distance travelled since 2002. Whilst it is noted that the factors influencing travel behaviour, both now and in future are "*too many to list*", key considerations include:

- The digitalisation of services, which will impact future mobility of passengers and businesses;
- Increased homeworking may reduce the need to travel;
- An ageing population who historically travel less and at different times to the working population, which will cause the "nature of travel demand to shift", whilst the younger cohort tend to also be travelling less;
- A sharp increase in car, bike and lift sharing, are predicted likely to grow further towards 2040;

- The influence of the built environment, i.e., people are more likely to walk and cycle if they are in proximity to local facilities and amenities that would otherwise necessitate car travel, i.e. shops, restaurants, schools, and

- Mobility as a Service (MaaS) could "support a move away from car ownership, potentially reducing congestion".

TRICS Guidance Notes

Changes in Travel Behaviour (August 2019)

4.1.21 TRICS Consortium Limited (TRICS) is responding to the fact that the world is experiencing significant change in relation to social, technological, economic and environmental drivers which in turn is creating new dynamics in travel behaviour and challenges for transport planning. In the face of deep uncertainty, the "predict and provide" paradigm that has framed transport planning processes is to give way to "decide and provide" paradigm – decide on the preferred future and provide the means to work towards that which can accommodate uncertainty.

4.1.22 The TRICS report includes a review of the National Travel Survey (NTS) 2016 and Road Traffic Forecasts 2018. The following is stated:

- The total distance travelled per person per year has fallen by 9% between 2007 and 2016. Distance by all motorised private transport has fallen by about 13% since 2003, and as a car driver by about 10% since 2007;

- Evidence from the NTS demonstrates vehicle trip rates have been declining over the last 20 years, with a reduction in trip rates of 13% since 2002; and

- Due to uncertainty around socio economic trends, the Road Traffic Forecasts assumes that young people reduce their licence holding acquisition compared to current levels and have extrapolated this trend in young people's licence holding up until 2050.

4.1.23 The TRICS report also sets out its own trend analysis dated May 2019. It states that there has been a 12% decline in vehicle trip rates (morning peak and all day) for residential development between 1989 and 2018.

4.1.24 The TRICS report further comments on the implications of the above evidence for TRICS. It states:

- "The evidence reviewed from All Change, the DfT RTF 18, NTS 2016 and the TRICS historic review demonstrates that there has been a sustained change in travel behaviour. This change is reflected in the trip rates for residential, retail (super food) and employment sites. Care need to be taken to ensure that the design of the residential and retail development, in particular, take account of these changes in travel behaviour";

- "If no recognition is given to the trends shown in the evidence from All Change and the DfT RTF18 report then it is inevitable that transport planning will continue to provide infrastructure that meets previous predicted needs rather than the transport needs of the future. This could lead to the over provision of highway capacity which in turn induces travel demand or the analysis could lead to the under provision of walking and cycling infrastructure or public transport services. The consequences are serious, and we run the risk of planning and developing stranded or underutilised assets"; and

- "The Business as Usual or "rear view mirror" approach, i.e. projecting past traffic growth trends and socio-economic trends to determine the need for infrastructure, in particular new roads and junction capacity has diminished relevance. The question becomes how

to plan in light of the evidence of trends and the uncertainty that lies ahead. As change in travel behaviour continues, it is anticipated there would a need for a more flexible approach in adapting or providing new transport measures for the development".

Practical implementation of the Decide and Provide Approach (February 2021)

4.1.25 TRICs consortium has recently published a guidance note on the implementation of the 'Decide and Provide' approach, acknowledging the social, economic, environmental changes which in turn are changing travel behaviour and patterns. This change has been further impacted and future uncertainty amplified by the COVID-19 pandemic.

4.1.26 The guidance is split into two Parts, and Part 1, explains the background and reasons for the Decide and Provide approach and states, "*Decide and Provide" (D&P) is a planning paradigm that is vision-led, rather than forecast-led (Predict and Provide), and which aims to improve the resilience of planning decisions by taking account of deep uncertainty about the future1. At its heart is deciding on a preferred future and providing a development path best suited to achieving it"*

4.1.27 Chapter 4, Paragraph 4.4 states that, "*The risks associated with sticking with the P&P* [predict and provide] *approach need to be recognised and acknowledged. If we continue to reproduce past transport solutions based on previous travel behaviours, it is inevitable that transport planning will continue to seek to provide infrastructure that meets previously predicted needs, rather than meeting, and indeed shaping, the transport needs of the future.*"

4.1.28 Paragraph 5.2 states, "*It is important that, as transport professionals, we engage fully with this paradigm shift. We need to take decisions and make provisions that respond to the following key drivers including the following:*

- The *drive towards Net Zero climate change or greenhouse gas (GHG) emissions.*
- *Strategies to decarbonise the transport sector, being progressed in the UK's Transport Decarbonisation Plan.*[2]
- *In terms of health and wellbeing, respond to the UK's obesity crisis (also further compounded by Covid-19) and further promote active travel provision"*

4.1.29 The guidance recommends using Scenario planning to develop a set of plausible scenarios that allows uncertainty to be accommodated within plan making. It refers to DfT's RTF183 Scenarios and assumptions and suggests the use of these scenarios based on scale, complexity and sensitivity of projects.

4.1.30 Part 2 of the guidance covers the practical application of the Decide and Provide approach. It describes about understanding the vision for the site, use of historic trends, use of current data from TRICs, forecasting future rates and sets out the monitoring requirements, using a real time example.

Micromobility

4.1.31 The "*Inrix: Micromobility Potential in the US, UK and Germany"* report dated September 2019 explains that "*Driving and public transportation have historically been the most popular ways to travel, but the explosion of micromobility technology has brought a wide variety of new options that could make urban mobility more efficient, accessible and convenient. The*

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf

[3] Traffic Forecasts 2018: Moving Britain Ahead (RTF18), published in July 2018

emergence of micromobility-as-a-service – defined as shared bikes, e-bikes and e-scooters – highlights both the consumer and commercial appeal".

4.1.32 The Inrix report further states that; "*The benefits of micromobility services stem from their higher efficiency in terms of energy and space. For example, the minimum square footage of one parallel parking space is 212 square feet, whereas scooters and bikes require three to six square feet to park. There's also a sharp contrast in energy efficiency; an e-scooter can travel up to 83-miles with the same amount of energy it takes an average gas vehicle to travel one-mile. However, nuance is needed in their adoption".*

4.1.33 The Inrix study concludes that *"micromobility faces a promising future by replacing short distance vehicle trips and providing currently underserved first- and last-mile solutions for public transit riders. The exceptionally high number of short duration trips found in all three countries highlights micromobility's massive market potential. Their flexible networks enable dynamic management of transportation networks providing travellers with fast, efficient alternatives to driving".*

4.1.34 Although not lawful to use on public highways at present (i.e., on highways, adopted footways, cycleways and the like), the growth of personal transport modes is likely to see changes to the way that these are used.

4.2 Summary

4.2.1 This growing evidence base, from both a national and local perspective, demonstrates that travel behaviour is changing, and that traditional methods of predicting future car travel based on historical trends, and providing for the required capacity, is outdated and predicts inaccurate forecasts.

4.2.2 Perhaps more importantly, providing for future car demand, based on historical trends, also creates negative (often unintended) consequences. A simple rule being that '*planning for people will result in places for people; planning for cars will result in places dominated by cars'*. Creating a car-dominant public realm, inducing additional traffic and therefore not solving congested networks in the medium term, worsening air pollution, and diverting funding and undermining the success of sustainable alternatives does not meet the vision for Gravity or Sedgemoor.

4.2.3 These trends and appreciation of future uncertainty and opportunities for future mobility options have been considered and incorporated into the Proposed Development and supporting transport strategy outlined in the following section of this TA.

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5 Developing the Gravity Transport Strategy

5.1 Introduction

5.1.1 The access, transport and mobility strategy for Gravity will need to respond to both existing conditions and emerging travel trends such as those explained in the previous chapter. Within the development the campus will be designed to prioritise the use of sustainable modes of transport, including the potential reinstatement of rail access for both passenger and freight services. Off site, proposals will ensure that there are attractive provisions to encourage walking, cycling, Micro Mobility and public transport trip making. The FTP provides the approach for active mobility management measures to be implemented to carry this through to the operational phases of the development, and provisions on site are adaptable to make the most of future changes in travel trends and technological advancements.

5.1.2 Chapter 4 of this report identified in detail that there are major societal shifts and other disruptive changes expected to have a significant impact on the way we travel in the future. We are likely to make fewer trips, shorter journeys, travel less by car and see reduced levels of car ownership.

5.1.3 Notwithstanding this, the way we assess the effects of increasing travel demand using 'Predict and Provide', and how we plan for the transport effects of development, has undergone little significant change since the publication of Planning Practice Guidance 13 over 20 years ago.

5.1.4 The traditional predict and provide assessment assumes no societal or technological changes in travel behaviour, which contradicts the vast amount of evidence, including those presented previously, which counters this approach.

5.2 Scenario Testing and Assignment Tool Overview

Overview

5.2.1 There is significant uncertainty around the future transport impacts of the Gravity development proposal, both because this TA is in support of an LDO and hence it is not currently known who the final occupiers of the site will be, what the final scale and type of development will be, whether it will be delivered on a phased basis and also because there is uncertainty around how we will travel in the future (see **Figure 5**, Lyons G below) as we have to adapt to a low carbon future.

5.2.2 The clear intent of Gravity is for clean growth, minimising the transport impact associated with the development, with a strong package of sustainable measures to reduce car dependency. In 2016, Glen Lyons set out how a range of possible futures can be considered, and this approach has been incorporated into this assessment through mapping future scenarios, considering Unlikely Futures (undesirable futures that we do not want), Plausible Futures and Preferred Futures.

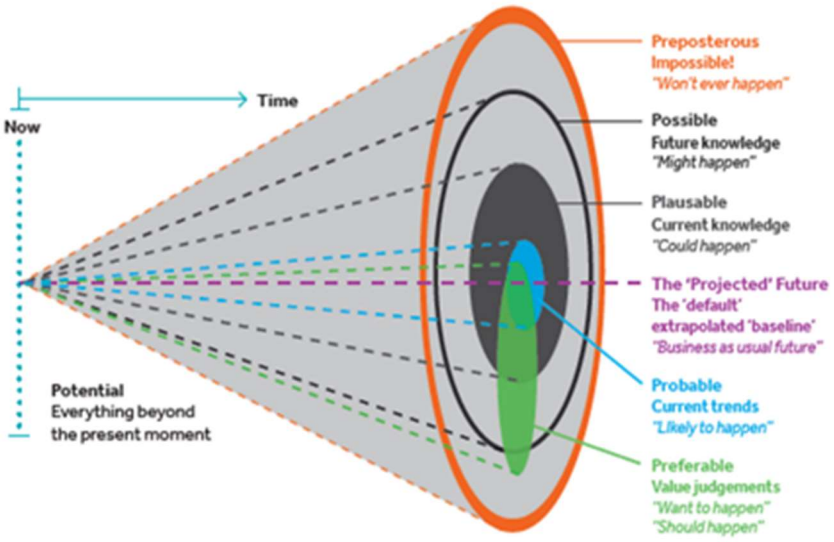

Figure 5: Lyons, G. (2016), Uncertainty ahead: Which way forward for transport, CIHT Futures.

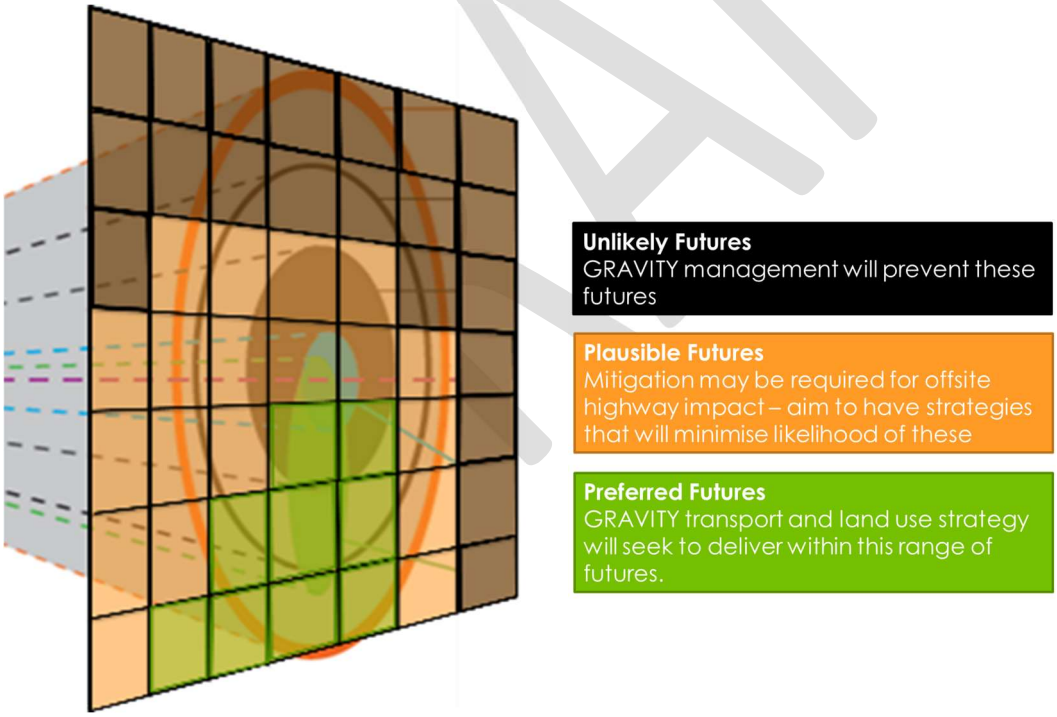

Figure 5 Uncertainty and possible futures

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5.2.3 To understand this in the context of Gravity, we need to be able to understand the range of possible futures to best understand how we could manage the development to achieve one of the Preferred Futures and to ensure that undesirable or unlikely futures do not happen.

5.2.4 Hence our approach has been to develop a bespoke scenario testing tool that enables the running of a wide range of scenarios and to demonstrate that there are a number of different sustainable futures that would be considered as Preferred Futures for the development and operation of the Gravity development.

5.2.5 In determining what is acceptable as a worst-case Preferred Future the key constraint has been set as the peak generation from the development in the peak traffic periods not exceeding that already approved for the smaller HEP extant planning consent with the clear aim to reduce the traffic impact to a level below this. The value of this cap is 1,367 vehicles in the higher AM peak (see **Table 1-1** of this TA) and an equivalent approximate 84% mode share as car driver (as reported in Table 7.1 of the PBA Huntspill Energy Park Travel Plan Framework). In considering this peak impact, we have also been mindful of not creating a new peak at a different time of day which can be seen as a secondary cap on development vehicle generation.

5.2.6 Hence, with this as a constraint, the tool has been developed to demonstrate that a larger than HEP development can be accommodated where the following are balanced to, as a minimum, meet the traffic generation requirement:

1) The scale of the development and number of employees. The scenario testing has been based around 7,500 employees.
2) The package of sustainable transport measures that provide a real alternative to the private car for a significant proportion of the workforce, recognising also the rural nature of Sedgemoor.
3) Where working practices, such as shift working, enable the site traffic peak periods to not coincide with the highway traffic peak periods.

5.2.7 This tool consists of two main spreadsheets; a scenario tool for multimodal trip generation and creation of an origin / destination zone matrix, and an assignment spreadsheet which assigns the vehicle trips to the highway network using an all or nothing approach for each zone pair. This approach has been undertaken due to the anticipated Sedgemoor strategic model not being available due to the impact of COVID 19 on collecting the necessary data.

5.2.8 The scenario 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.

5.2.9 The tool has been used to identify a single ‘core scenario’ for testing which is based on a comprehensive sustainable package of measures, but with a vehicle generation outcome that could be achieved in a number of different ways. In addition, the approved HEP scenario has been retested through this spreadsheet tool and a Business as Usual (BAU) assessment has been undertaken at the request of SCC and NH as a comparable against the ‘core scenario’. The BAU test reflects a worst-case assessment as it doesn’t incorporate the enhanced Gravity measures that would achieve the proposed step change in sustainability.

What does the scenario testing and assignment tool do?

5.2.10 The scenario tool is an MS Excel based tool which includes the following functions:

1) It calculates trips by mode across the day for each land use on the site based on the number of people in employment and number of residents on site. All trip rates are presented as person trip rates.

2) It uses a first principles person trip rate approach to generate the trips from the Advanced Manufacturing use on the site which is the primary trip generator and for which there are no suitable sites in TRICS.
3) It assigns the person trips to an origin and a destination based on the zone system developed for the Sedgemoor model.
4) It generates a separate mode share for each Origin Destination pair based on the available mode choice and journey time to/from the site. It assigns walk and cycle first taking account of the zones which are within walk and cycle distance of the site and then uses a logit model to distribute trips between public transport (bus and rail in the rail options) and car.
5) It enables the testing of the sensitivity of different future scenarios based on a wide range of different input variables and the determination of representative key scenarios for trip assignment and junction testing.
6) It outputs an overall mode share table and multimodal trip matrix to enable trip assignment.

5.2.11 The trip assignment tool is an MS Excel / GIS based tool that uses an all or nothing assignment approach to assign each Origin-Destination (OD) pair of highway trips to the highway network based on network journey times from pre-COVID 2018 Teletrac Navman floating car data. Whilst the scenario tool has been used to test a wide range of different scenarios, the trip assignment tool has only been used for the three scenarios that have been tested on top of the future year (2032) base: Core, Business as Usual (BAU) and HEP.

How the Person Trip Rates were Developed and profiled across the day

5.2.12 Whilst the scenario tool has the flexibility to test a range of different land uses on Gravity, there has been a clear steer from the client that there is significant interest from a number of global businesses in the site as a site for a Gigafactory for advanced manufacturing and this has informed the key development parameters and assumptions for this LDO application. The land uses used in the scenario tool are set out in **Table 5-1**.

Land Use	Employees	Approach (basis for person trip generation)
B1a	125	TRICS person trip rates used
B1b	583	TRICS person trip rates used
B1c	160	TRICS person trip rates used
B2	0	TRICS person trip rates used
B8	188	TRICS person trip rates used
Advanced Manufacturing	6,098	First principles based on evaluation of similar manufacturing across the globe and from information from potential occupiers - 10% of these employees assumed to be office workers with trip characteristics as per B1a.
Supporting Uses	348	These are predominately ancillary uses such as fitness centres to be used by the employees on the site – for simplicity in the tool, 90% of these employees have been assigned to the Advanced Manufacturing and 10% to B1a office uses.
Total	**7,502**	

Table 5-1 Scenario tool land uses

5.2.13 The main site use is the 6,098 employees associated with the Advanced Manufacturing (Gigafactory) for which there is no suitable data in TRICS. The number of employees has been estimated from a combination of available information on global sites and knowledge of potential occupiers of the sites. Large Gigafactories will be operating shift patterns and Gravity will manage shift patterns to avoid high car trip generation during the traditional peaks and to enable employees to travel by different modes and in particular demand responsive transport (whether public or privately operated for the factory and associated uses).

5.2.14 Hence different scenarios have been developed for 2 shifts (17-hour day - 12-hour shifts are illegal in the UK) and 3 shifts (24 hour day). 10% of the Advanced Manufacturing workforce has been assumed to be supporting staff working normal office hours based on an a B1a arrival departure profile with the rest split over 2 or 3 change over periods. This is a simple assumption and in reality, a more distributed change over in shifts could be expected across such a large workforce to manage peaks of people all arriving and departing at once. In addition, there are a number of ancillary facilities for staff on site, such as fitness centres, which employees may use before or after work, further distributing the arrival and departure times away from a large peak.

5.2.15 For the rest of the site uses, TRICS profiles have been used to generate a daily profile of trips which has been combined to provide an overall daily profile for the site.

5.2.16 Housing trip generation for the 750 dwellings has also been included in the tool. This has been based on the distribution of house sizes shown in **Table 5-2** and the tool allows for different levels of internalisation of residential trip by journey purpose. This enables assessment of different levels of internalisation for the proposed housing, where working on the Gravity site will be a pre-requisite for living there, and where the proportion for internal journeys to work will be reflective of the number of other house occupants who also work. 50% internalisation (i.e. all households have two people who work of which one is assumed to work on site) is conservative and 70% and 90% has also been tested. The scenario tool is robust as it reduces the number of home to work trips based on commute data from NTS data, where not all households will be working households. It also enables the testing of a BAU case with open market housing for which the NTS data is fully applicable, where a reduced 10% of internalisation of commute to work journeys could be expected.

House Size	Proportion
1 Bedroom	10%
2 Bedrooms	20%
3 Bedrooms	50%
4 Bedrooms	20%
5 Bedrooms	0%

Table 5-2 Housing split

Home working

5.2.17 Home working has come to the fore recently with the impact of COVID and at one point up to 46% of employees in the UK were working from home, as compared to around 13% pre COVID in Sedgemoor. Homeworking is a combination of people whose business is based at home and employees who work in an office, for example, who chose to work one or more days a week at home. However, businesses have also responded to home working, with some

downsizing or not increasing floor space as they recruit more employees, increasing employee density.

5.2.18 For Gravity, the majority of the development is advanced manufacturing for which only a small proportion of employees are likely to have the ability to homework. For other office type uses on the site it is considered that they won't be paying for empty floor space but instead floor space that reflects the number of employees that will typically travel into work and hence home working will not reduce trip rates. Where home working has the potential to reduce trip rates is in the residential generated trips however with the housing linked to the employment (i.e. within the 'core' scenario) this impact will also be very small. Hence the homeworking function in the scenario tool has been left as default for all scenarios. The default value is 6%. This is lower than the reported 13% for Sedgemoor as analysis was undertaken to calculate the home working rates for office workers only and to exclude home businesses.

Origin Destination Matrix

5.2.19 An origin destination matrix has been created for the employment and for the residential trips based on a gravity model. The zones for the gravity model have been based on the Sedgemoor model zones. For simplicity for the spreadsheet model, zones have been allocated into 15-minute journey time bands from the site and a maximum commute of 90 minutes has been assumed.

5.2.20 The gravity model has been based on census data journey to work and the census population data (for employment trips). Residential work trips are based on destination zone employment values. Other residential trip purpose calculations (trip purpose split calculated from National Travel Survey (NTS) data) are based on zone population.

5.2.21 Sensitivity testing was also undertaken with TEMPro instead of Census data for the employment trips which had minimal overall impact.

5.2.22 Two scenarios have been created for employee trips to Gravity. The first is based on employees being distributed across the travel to work area and reflects the living locally and upskilling of the local workforce to work at Gravity. The second assumed that there would be a higher proportion of people travelling from Bristol and Exeter with the assumption that knowledge workers (NVQ level 4 and above) would be drawn from a wider area to higher value jobs at Gravity and would commute further to work

5.2.23 Within the gravity model, each zone is assigned to a distance band based on a 15 min travel time. The modes of travel available to people travelling was then applied on a zone-by-zone basis, reflecting walking and cycling distances and accessibility to public transport and how the tool addresses the different modes is considered in more detail below.

How the different modes are addressed in the scenario tool

1) Walking – Zones accessible to Gravity by walk have been identified based on an average walk speed of 4.8kph (3mph) and a maximum walk time of 1 hour (**Figure 6** below). Census data has been used to identify the proportion of trips that would walk within each of the 15-minute time bands and the relevant mode shares have been applied to each individual zones within walking distance. Only zones that you would reasonably walk from, with suitable infrastructure, have been included. For example, we have not assumed that people will walk along unlit country lanes even though the distance is suitable for walking. Application of the walking mode share was undertaken first in the tool.

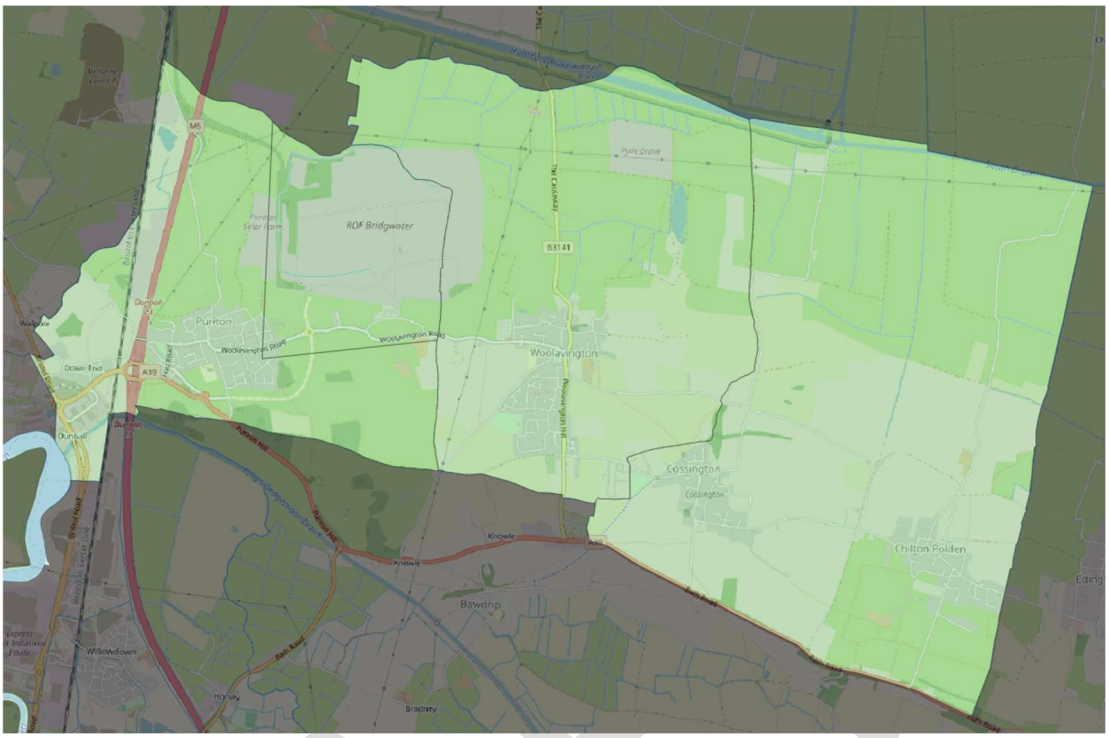

Figure 6 Zones with walk accessibility

2) Cycling - For cycling we have also included access by e-bikes and e-scooters. Whilst e-scooters may have significant impact their future role remains uncertain and hence are difficult to separate out as a separate mode.

As with walking, the Census data has been used to determine cycling mode share from each zone that is accessible by cycle. As with walking we have also excluded zones within distance, but which would only be cycled by experienced cyclists to provide a robust assessment (this excludes any trips above 30km). The assessment has been made more robust though discussion with SCC where zones requiring trips to cross the motorway have had a penalty added to them. The penalty increases the distance band by 1 when calculating mode share. This reduces the overall cycle mode share for such zones. This also combines with the maximum allowed travel distance and effectively limits maximum cycle distance to 20km.

The model allows for future cycling scenarios to be tested with an uplift to cycling. The propensity to cycle tool has been used as the basis for this with a factor of 1.25 for 'Government Target', 4.5 for 'Go Dutch' and 6.5 for 'e-bike' scenarios. To be robust, these uplifts have only been applied to those zones where cycle infrastructure improvements are proposed, notably for Bridgwater, Puriton and Woolavington (**Figure 7** below).

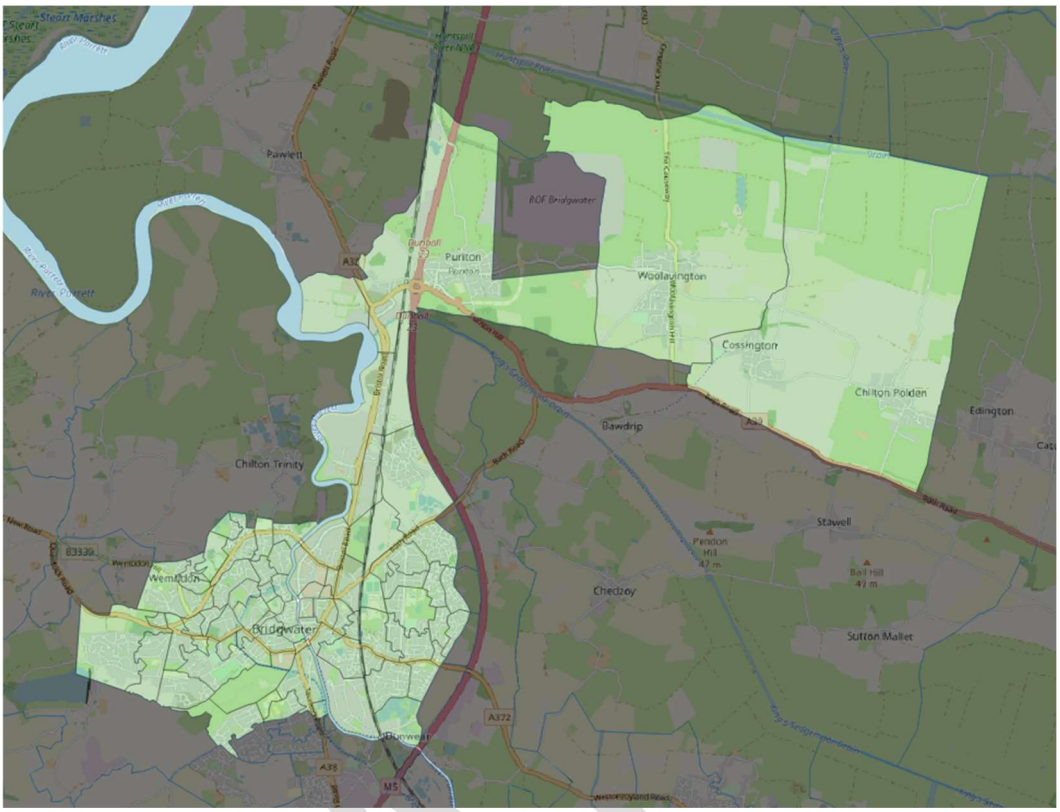

Figure 7 Zones with potential cycle uplift applied

3) Public transport including bus, demand responsive bus and rail. Once trips have been assigned to walking and cycling within each zone, a binary Logit model has been used to assign the remaining trips between public transport, bus and rail, and private car.

   Each zone with a bus service through it is modelled in the logit model based on the frequency of the service and journey times which are based on timetabled information for the existing and an extrapolation of this for future services. The scenario tool takes account of the proportion of each zone that is realistically accessible to the public transport service. In the future scenario, demand responsive transport, such as a dedicated minibus service for employees of Gravity, has been considered. Not all zones have been considered to be accessible by the DRT and a realistic service range from Gravity has been allowed for.

   There are two rail options in the spreadsheet model, as existing (i.e., without rail servicing the site directly) and with a new railway station within the Gravity development proposals. The model assumes that all zones within 1km of a station are accessible and a walk time has also been allowed for between each zone centroid and the station, and ongoing journey times have also been incorporated where there is an ongoing connection, say from Bridgwater station to Gravity by bus in the scenario without a rail station on site.

   An iterative process has been used for the proposed network to output initial passenger demand numbers to develop a public transport strategy, traditional bus services and DRT, which has then been updated in the model.

   The binary logit model was validated against the HEP mode share and Sedgemoor census data to be robust. This involved increasing the Delta value in the model from 31, a default value for the UK from Census data to 40, where the higher the Delta value the lower the attractiveness of public transport as against the private car.

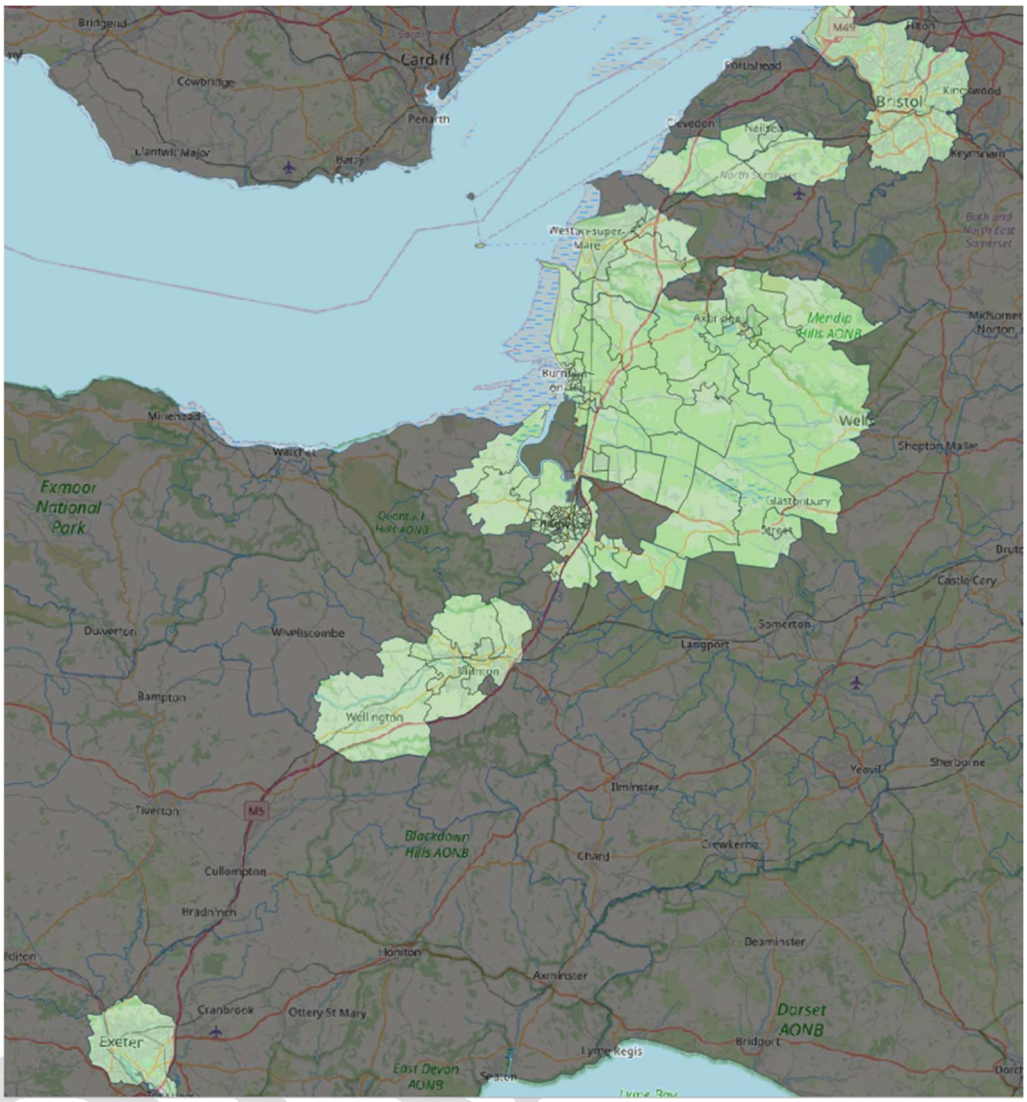

Figure 8 Zones with PT accessibility (bus and rail) Core scenario

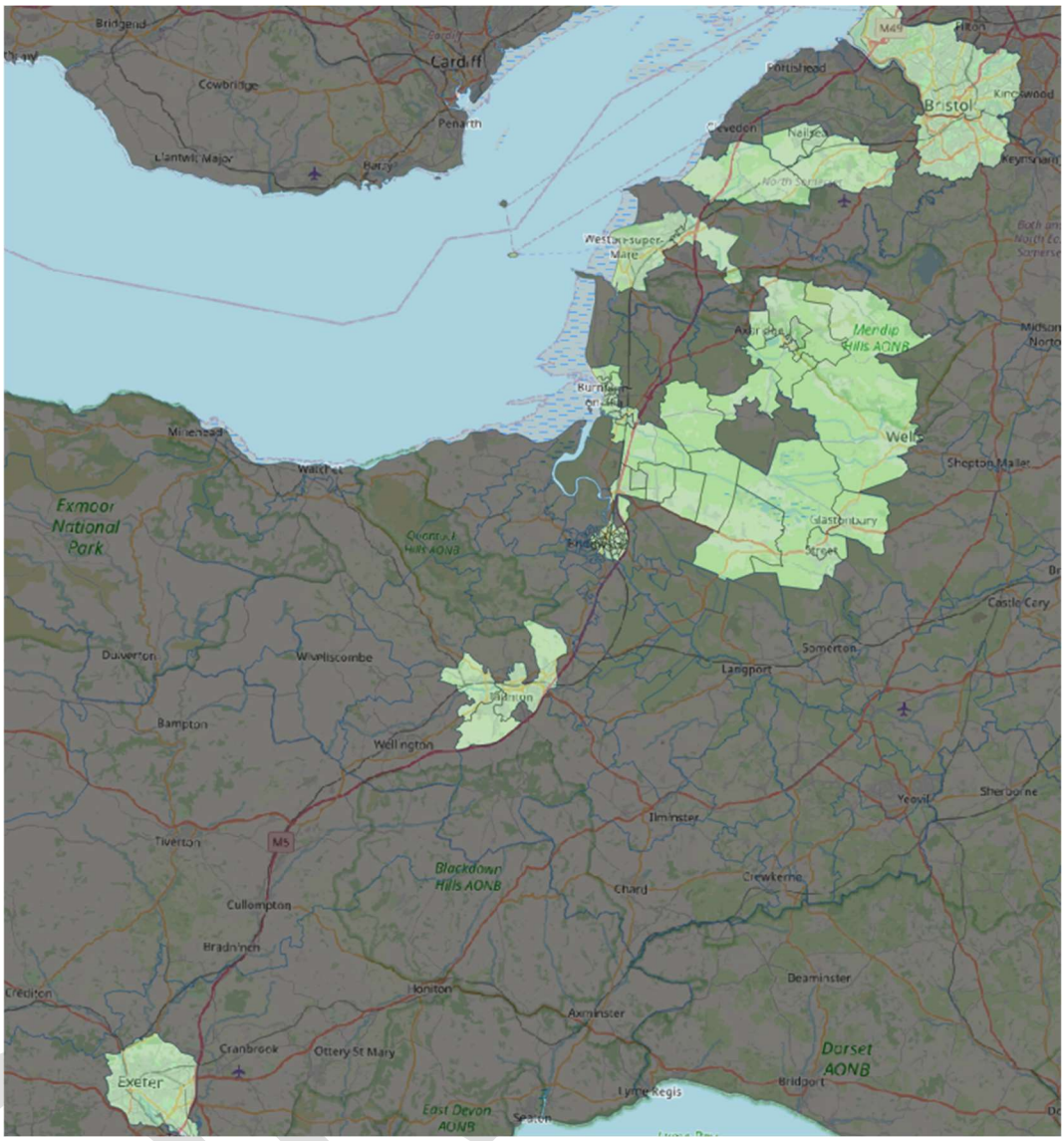

Figure 9 Zones with PT accessibility (bus and rail) Business-As-Usual scenario

4) Car – car trips make up the remainder of the trips after walk and cycle have been removed and the Logit model for balancing car and public transport has been applied.

   Car share will be encouraged for journeys that cannot be made practicably by other modes. The base car share from census for Sedgemoor is 92.41% of people who travel by car are car drivers. We have then identified a range of shifts to increase car mode share that can be supported through the Gravity travel plan for trips to Gravity. These are Encouraged (90% car driver, 10% car passenger), incentivised (88% car driver, 12% car passenger) and max potential (80% car driver, 20% car passenger).

Cost incentives to encourage modal shift

5.2.24 As set out above, a Logit model has been developed to assign the mode share between public transport and the private car. Given the rural nature of Sedgemoor, a public transport option will be modelled as less desirable than a car for a large proportion of the workforce within the Logit model evaluation which is based on traditional attitudes to public transport. However, it is the aim of Gravity to be a centre of green growth with active polices and incentives for employees to travel sustainably.

5.2.25 In terms of the scenario tool a simple cost function has been included that feeds into the Logit model and changes the cost balance between car and public transport. This has nominally been referred to as a parking charge of £5, £7.50 or £10 per day, however this does not necessarily have to be delivered as a direct user parking charge and Gravity will have a number of ways of realising this value in changing the balance between public transport and the car. Other examples include, high quality dedicated minibus services, sustainable transport incentives, reward schemes for employees, managing parking supply and dedicated car sharing spaces amongst a range of options as well as the potential to introduce pricing.

Input Variables

5.2.26 The scenario tool input variables discussed above and the sensitivity of the scenario tool to different scenarios for peak hour traffic generation is summarised in **Table 5-3**. The order of impact of different variables on sustainability is based on a comparison with the BAU scenario.

Input variable	Description of Variable	Sensitivity of the model to the Variables in comparison to the BAU scenario as a base.
Changing work patterns	Changing number of shifts in the main advanced manufacturing land use – 2 or 3 shifts with change times in line with current morning peak or shifted to avoid peak periods.	Changing shift patterns has minimal impact on modal share, however it can have a very large impact on peak period traffic generation. Moving the day shift in a 3 shift 24 hour day from starting at 8am to 6am reduces peak hour traffic by around 12%
Internalisation of commuting trips	Internalisation of commuting trips between residential (for housing on site) and employment land uses. 10% has been assumed for open market housing with 50%and 70% variable options.	This has little impact on the external trip modal share but reduces the total number of trips by car, replacing them with internal trips that are expected to be more sustainable. 50% internalisation removes around 230 car driver trips in the AM peak hour and 70% internalisation removes about 360 car driver trips in the AM peak hour.
Incentives / Parking Charges delivered with Public transport	These charges represent a value of investment, incentive or deterrent to create a better balance between the perceived cost of car travel vs public transport. This intervention is designed to be delivered alongside a high-quality public transport strategy and not delivered on its own.	Coupled with a high-quality public transport strategy, a £5 investment / cost leads to a modal shift from car driver of about 5%, a £7.50 cost leads to around a 7.5% shift and a £10 cost leads to around a 12% shift.
Cycling	Cycling, including e-bike and e-scooter can influence	Cycling has the potential to reduce car driver mode share by about 4.85% with 'Go Dutch' and 7.5% with the e-bike scenario. If we assume that crossing the M5 over the foot/cycle bridge is not a deterrent to cycling from Bridgwater then we could see an overall shift by a further 2%.
Home working	Low: 13% (6% homeworking, the rest having businesses based at home)	Assumed that home working practices will not impact the number of employees travelling to work as business floor areas will be optimised to number of employees allowing for home working. This does

	Medium: 20% High: 30% Potential: 46% overall (COVID surveys during lockdown)	impact on work trips from the 750 residential units but with the housing linked to Gravity the impact is not significant in any scenario.
Knowledge Workers	Re-distribution of trips based on distribution of population with NVQ level 4 and above.	Impact is not significant as it biases towards further away zones that already have a higher car mode share. 30% knowledge workers increase car by 0.3% and 60% knowledge workers by 0.65%
Public transport provision without incentivisation	Existing bus with options for additional bus services, DRT services and a new railway station. Different headways have been run for the proposed DRT with 15 min, 30 min and 1 hour headways.	Very limited impact on its own based on Logit modelling given the rural nature of Somerset and the relative attractiveness of the private car. However, there is significant potential when combined with cost / investment incentives as above. Logit model is not very sensitive to increased bus frequency, even with a 15 min DRT service, mode shift from car would still be less than 1% and it is similar with rail.
Car Share	Encouraged (90% car driver, 10% car passenger) , incentivised (88% car driver, 12% car passenger) and max potential (80% car driver, 20% car passenger)	Car sharing has a reasonable impact on car driver mode share – Encouraged (-1.3%), incentivised (-2.4%) and Max Potential (-6.4%)

Table 5-3 Scenario tool input variables

Validating the Tool

5.2.27 To validate the tool a comparison has been undertaken between the HEP modelling using the new scenario tool to that submitted in the approved HEP consent. To do this, the HEP land uses have been input into the scenario tool. These excluded the HEP safeguarded land for energy uses. HEP also did not have any residential development and hence the validation has been based on just the employment uses. **Table 5-4** shows the comparison of the car trip generation for the weekday morning and evening peaks.

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Peak	Original HEP Consent	Scenario Tool	Difference
AM Inbound Car Trips	860	876	16
AM Outbound Car Trips	365	371	6
PM Inbound Car Trips	311	317	6
PM Outbound Car Trips	806	818	12

Table 5-4 Car trip generation comparison for validation

5.2.28 The spreadsheet tool results in a marginally higher light vehicle generation in comparison to the original HEP consent. This is due to the spreadsheet tool having a slightly higher car mode share as a result of the input parameters. The spreadsheet tool has a car driver mode share of around 85% whereas the original consent estimated a car driver mode share of around 84%.

5.2.29 The results are very similar overall which provides additional confirmation that the spreadsheet tool provides a good basis for the Gravity scenario tests.

Developing the scenarios to test

5.2.30 Over 100 scenarios have been run through the tool in the process of developing the strategy for the development in consultation with key stakeholders including NH and SCC, and these have been used to help shape the policy for the site around operational assumptions, housing provision and sustainable travel measures.

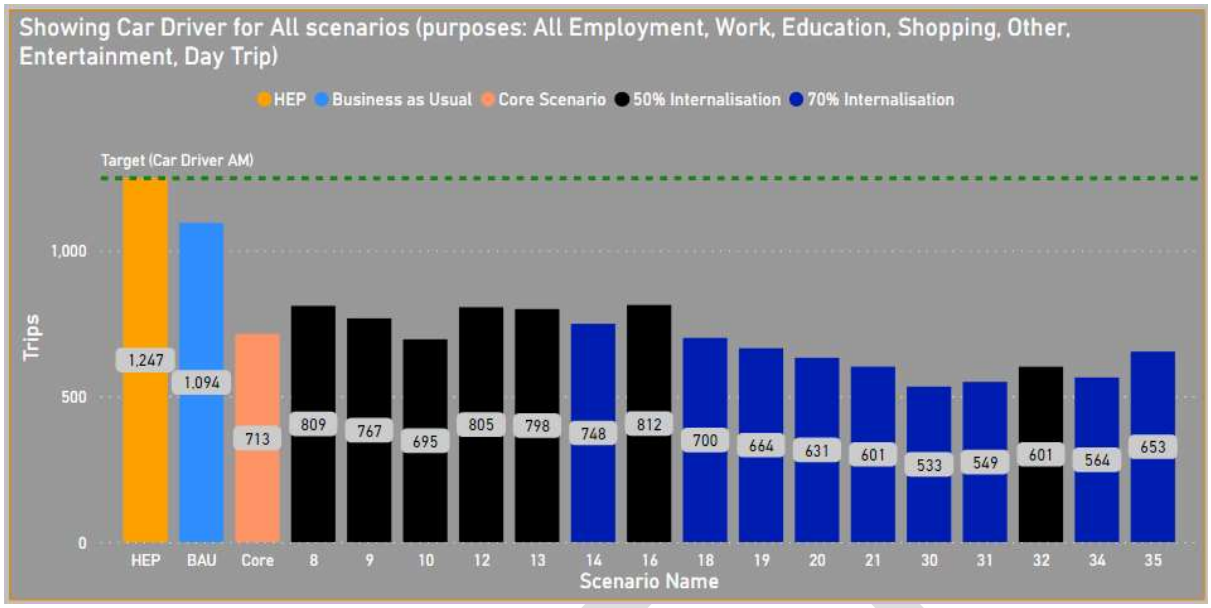
5.2.31 Three scenarios have been developed from this extensive testing stage:

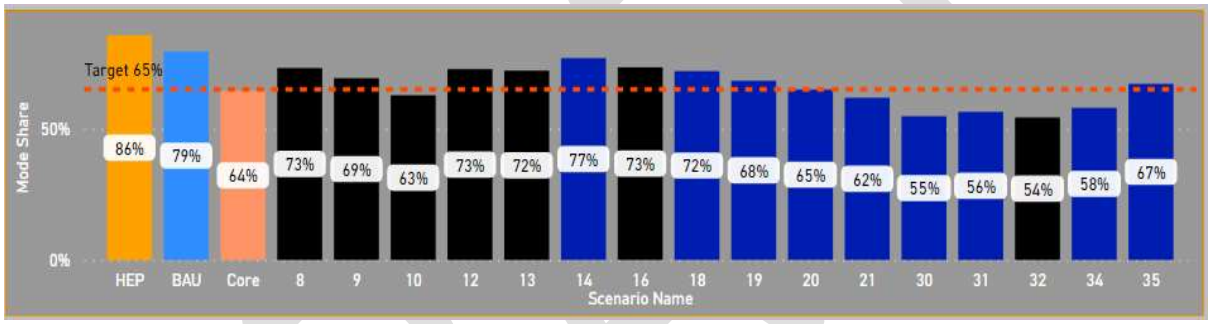
1) HEP – this is to enable the comparison of the HEP consent against the proposed Gravity development using the new scenario tool.

2) Core – this is the proposed sustainable Gravity scenario

3) Business as Usual – a worst case which assumes a high car mode share based on the original HEP assessment.

5.2.32 The PowerBI output summary of the final runs, shows the AM peak car trips and AM peak modal share for the three main scenarios and an example of the range of alternative futures considered.





5.2.33 A 65% mode share by car was determined based on it being an achievable target in the context of the range of scenarios and the green growth agenda for the development. Note that this is a mode share for external trips, end hence, for example, internalisation of commute trips from the residential development leads to scenarios with lower car trip generation but with no impact on external mode share.

5.2.34 From a range of potential scenarios that achieve 65%, one was chosen for the test and the specific assumptions used in this test are shown in **Table 5-5** in comparison to the assumptions for HEP and Business as Usual Options.

Core Scenario – Key Variables	HEP and BUS – Key Variables
Go Dutch cycle uplift applied to Bridgwater, Puriton and Woolavington zones	No uplift to cycling
£7.50 incentive cost / parking charge applied	No Cost applied
DRT bus service provided	Existing bus services with service enhancement proposed with HEP
Incentivised car share for employment (88% of car trips are car driver, note default is 92.41%)	No incentivised car share
Employment non-commute (i.e., lunch trips etc) internalisation of 60%	As Core Scenario for BAU – no residential in HEP
Residential – work internalisation of 50%	Residential – work internalisation of 10% for BAU – no residential in HEP
Residential – shop internalisation of 30%	As Core Scenario for BAU – no residential in HEP
Residential – other internalisation of 30%	As Core Scenario for BAU – no residential in HEP
Residential – entertainment internalisation of 30%	As Core Scenario for BAU – no residential in HEP

Table 5-5 Assumptions adopted

5.2.35 The overall mode share comparison for the different scenarios (external trips only) taken forward is shown in **Table 5-6**.

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Mode	HEP	BAU	Core
Car Driver	85.36%	79.21%	65.05%
Car Passenger	7.01%	14.12%	16.80%
Cycle	2.81%	2.32%	7.34%
PT	3.68%	3.34%	9.83%
Walk	1.13%	1.00%	0.97%

Table 5-6 Modal share comparisons

Distribution of vehicle trips onto the highway network

5.2.36 The resulting vehicle trips have been assigned to the highway network using an all or nothing assignment process using a GIS network with the same zoning systems as the Scenario Tool. Journey Time routes, extracted from Teletrac Navman for the Sedgemoor model, have been used as the basis for the zone-to-zone journey times (see figure). These are pre COVID (from 2018) journey times to reflect the real conditions on the network in the peak periods. A custom assignment method was used to then identify the lowest travel cost between each zone and Gravity. The available Teletrac Navman journey time route segments were built into a weighted graph representing the possible paths that could be taken. Each zone was then connected to the closest journey time route segment on this path. To allow for the time taken to get to a journey time route, an average speed of 30mph was included. Finally, the routes were individually checked and adjustments made where necessary, for example for routes to be logical in the centre of Bridgwater.

Navtec Navman Routes used in the assignment and example routing of zone 55

5.2.37 From this distribution, trips were then assigned in detail to the local highway network covering Gravity, Woolavington, Puriton, the new link road to the A39 and the M5 Junction 23 and Dunball Roundabout.

5.3 Summary

5.3.1 There is significant uncertainty around the future transport impacts of the Gravity development proposal, both because this TA and the accompanying FTP are in support of an LDO, and hence it is not currently known who the final occupiers of the site will be, what the final scale and type of development will be, whether it will be delivered on a phased basis and also because there is uncertainty around how we will travel in the future as we have to adapt to a low carbon future.

5.3.2 Notwithstanding this, the clear intent of Gravity is for clean growth, minimising the transport impact associated with the development, with a strong package of sustainable measures to reduce car dependency.

5.3.3 To understand this in the context of Gravity, we needed the ability to understand the range of possible futures to best understand how we could manage the development to achieve one of the Preferred Futures and to ensure that undesirable or unlikely futures do not happen.

5.3.4 Our approach has been to develop a bespoke scenario testing tool, as explained more fully above, that has enabled the running of a wide number of scenarios and to demonstrate that there are a number of different sustainable futures that would be considered as Preferred Futures for the development and operation of the Gravity development.

5.3.5 The scenario tool was developed in consultation with 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.

5.3.6 The tool has been used to identify a single ‘Core Scenario’ for testing which is based on a comprehensive sustainable package of transport measures, but with a vehicle generation outcome that could be achieved in a number of different ways. In addition, the approved HEP scenario has been retested through this spreadsheet tool and a BAU alternative Gravity assessment has been undertaken at the request of SCC and NH as a comparable against the ‘Core Scenario’. The BAU test reflects a worst-case assessment as it does not incorporate the enhanced Gravity sustainable transport measures that would achieve the proposed step change in sustainability.

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6 Development Proposals

6.1 Introduction

6.1.1 This chapter explains the Gravity scheme vision and ambitions, and then outlines the scope of the Proposed Development with reference to a series of LDO Parameter Plans and the Design Guide.

6.1.2 The Gravity development proposals have been framed around a clear vision for the site and client ambitions and given the nature of the LDO process, the development proposals are expressed by an overarching 'description of development' and a series of LDO Parameter Plans, alongside a supporting LDO Design Guide (prepared under separate cover).

6.1.3 This broad context is summarised within this section of the TA including the aim to inherently manage travel demands through the delivery of a mix of land uses at Gravity, before outlining the approach to developing the Gravity Transport Strategy, describing the principles of the Gravity Mobility Strategy and outlining the supporting package of key transport proposals including:

- Vehicular site access – covering primary, secondary, emergency access
- Pedestrian, Cycle and Micro Mobility Access
- Bus service enhancements

6.1.4 This chapter refers to various figures, drawings and appendices. As stated previously, all such information is included in a separate Stantec TA Appendices Report.

6.2 Gravity Vision and Ambitions

6.2.1 The Gravity vision is set out below, followed by the Gravity Objectives.

"To meet the challenges of the future, the UK must shift to a cleaner economy that embraces innovation by creating spaces that allow forward-thinking companies and local communities to thrive. We want to seize this transformation by enhancing the experiences for businesses by providing a smarter, more sustainable and operationally efficient campus.

That is why we created Gravity – a clean, smart campus where new businesses can grow and established giants can break the mould. Ideally located in Bridgwater, Somerset, with direct access to the M5 and accessible by rail, air and sea, the site will offer over 635 acres, with opportunities for up to millions of sq ft of scalable, flexible and shared working space.

There is no other UK site ready to be developed at such scale and speed, with everything in place for tomorrow's innovators to grow today. With its on-site clean energy solutions, dark fibre, excellent transport links, accessible talent pool and knowledge economy – including four top-tier universities close by, Gravity provides occupiers with the ability to build, expand and develop faster and more efficiently. Gravity will be a beacon for evolving a clean growth economy in the South West. Join us as we bring forward the future, naturally."

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6.2.2 Through the LDO Project Charter, the following objectives for Gravity are set out:

- Be an exemplar in responding to the Clean Growth challenge, striving to accelerate the transition to a net zero carbon model fit for the future.
- Have a transparent approach to responding to the Sustainable Development Goals, and will establish clear priorities on well-being and inclusivity, clean energy, transport, natural resources, digital and innovation.
- Be underpinned by a clean growth energy strategy through EON Energy, providing an electro grid and a toolbox of low carbon energy management and supply solutions to reduce consumption and energy demand, capture energy generation from the site and to deploy bespoke energy systems to meet occupier needs.
- Be inclusive, creating 'decent' employment opportunities, local supply chain opportunities, linked to apprenticeships, training and development, embedded in employment and skills plans.
- Offer a UK proposition for FDI through DIT, including links to Bristol port and space to host international and national scale facilities in the South West region.
- Target advanced manufacturing, life sciences, cyber, automotive / electric vehicles / e-mobility and agri-tech sectors.
- Facilitate rail restoration and new transport choices with end-to-end e-mobility.
- Be a test bed for innovation, including smart mobility and 5G deployment.
- Integrate a broad range of ancillary uses to support and increase the attractiveness of the smart campus to enable a 'live work play' scenario, thereby enabling deliverability.
- Create a range of housing solutions as part of a linked, clean and smart community, which seeks to reduce the need to travel, including homes for key workers, through private sector rent serviced accommodation, hotels, executive homes and inter-generational and extra care housing to ensure and cohesive and sustainable community.
- Consider the 'art of the possible' is responding to the challenge, whether large scale or small.

6.2.3 There are a number of Strategies that shape the vision, 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.

6.2.4 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.

6.2.5 The Digital Vision, also 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.

6.2.6 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 transitionary and short-term solutions with suggested five-year time horizons, considering potential uses / demands on Site and evolving solutions without being technology specific.

6.2.7 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.

6.2.8 Similarly, a Gravity Business Charter, submitted with the LDO, will seek to stimulate business and supply chain opportunities.

6.2.9 A Gravity Locality Investment Plan, submitted with the LDO, has also been developed as part of the EZ implementation plan to plan 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 EZ status can delivery for the locality.

6.3 LDO Parameter Plans

6.3.1 The Proposed Development is defined by a series of Parameter Plans to show the flexibility in the development consented by the LDO. These are as follows and are provided in **Appendix H**:

- Land Uses
- Transport and Movement: Strategic Infrastructure
- Transport and Movement: Micromobility
- Building Heights
- Infrastructure and Utilities
- Strategic Landscape; and
- Existing Buildings to be Demolished

6.3.2 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 H**.

6.3.3 An accompanying Gravity LDO Design Guide has been prepared and submitted under separate cover, providing further details of the approach to design within the site including access and movement principles which are considered within this section of the TA.

6.4 Mix of Uses

6.4.1 The Gravity development proposals seek to inherently manage travel demands through the delivery of a mix of land uses supporting the primary employment site, these include:

- A commitment to manage shift patterns to maximise sustainable travel opportunities for employees and limit residual traffic impacts in the traditional network weekday AM and PM peak periods.
- Provision of supporting (e.g. retail, leisure, health) land uses specifically to support employees and/or on-site residents (with the exception of the 37 Club which is to be retained for wider community use/access in line with existing arrangements).
- Residential development for on-site employees and to be subject to appropriately worded conditions linking occupation to employment on site.

6.4.2 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

6.4.3 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.

6.4.4 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.

6.4.5 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 H**) with an Advanced Manufacturing facility. Alternatively, this part of the Site could consist of a series of smaller units with several operators.

6.4.6 Commercial use E (a) – (g) is also proposed within the green hatched area on the Land Uses Parameter Plan in **Appendix H.** Commercial land uses will come forward that will complement and sit alongside other land uses proposed within that area.

6.4.7 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 H**.

Sui Generis

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

Sport and Leisure

6.4.9 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 H**; and
- Leisure use such as gyms, cafes, community facilities, nursery and residential accommodation across the blue and green hatched areas.

6.4.10 The scope of the provision will 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.

6.4.11 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

6.4.12 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.

6.4.13 If demand requires, as a result of the residential element of the Proposed Development, early years, primary and secondary education will be provided is this need cannot be satisfied through existing provision.

Hotel

6.4.14 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

6.4.15 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.

6.4.16 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 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.

6.4.17 Residential land uses are proposed within the green and purple hatched areas on the Land Uses Parameter Plan (**Appendix H)** and a balanced and appropriate mix of dwelling types and tenures will be provided to meet identified occupier needs.

6.4.18 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.

6.4.19 Wider community and locality uses are also proposed in the blue hatched area, such as for re-provision of a new 37 Club, which could be supported by other uses to support viability including a café, playground, cycle hire.

6.4.20 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.

Rail

6.4.21 There is an aspiration to re-open the disused rail line connecting the site to the main Exeter-Bristol line to facilitate both passenger and rail freight services. This option has been explored in a pre-grip technical study by Network Rail, and has been demonstrated to be feasible in terms of both infrastructure and operational capacity. It would deliver clear benefits in terms of reduced highway trips for both passenger and freight services. However, any requirement for rail opening will be linked to end occupier needs.

6.4.22 Further to comments made by NR in their ES scoping response, any rail reinstatement as part of the development proposals is likely to include improvements to the existing little used level crossing at Hardy Mead Drove, along with repair or replacement of the existing M5 rail bridge.

6.4.23 In light of the above, 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 H**. 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).

6.4.24 Passenger rail could 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.

6.4.25 Freight rail could 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 would be provided at this location although this would be subject to occupier needs, along with associated infrastructure including mobile gantry cranes and roads.

6.4.26 From discussions with the DfT and NR, there is a shared ambition to deliver both passenger and freight services and it is expected that this facility will be in place by mid 2020's and would lead to reductions in future Gravity passenger and freight traffic movements. However, for the purpose of detailed impact assessments set out within this TA and resulting travel demand calculations and mode share targets, it has been assumed (as a worst case in terms of traffic impact) that the planned rail facility may not be delivered.

6.5 Gravity Transport Mobility Strategy Principles

6.5.1 There is significant uncertainty around the future transport impacts of the Gravity development proposal, both because this TA and the accompanying FTP are in support of an LDO and hence it is not currently known whom the final occupiers of the site will be, what the final scale and type of development will be, whether it will be delivered on a phased basis and also because there is uncertainty around how we will travel in the future as we have to adapt to a low carbon future.

6.5.2 Notwithstanding, the clear intent of Gravity is for clean growth, minimising the transport impact associated with the development, with a strong package of sustainable measures to reduce car dependency.

6.5.3 The principles outlined in this section of the TA are embedded in the outline design proposals for the Gravity development as set out in the supporting Design Guide. Within this TA we have extracted some of the key transport principles for further consideration.

6.5.4 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, whilst also being resilient to future travel patterns and systems.

6.5.5 The Gravity Transport Mobility Strategy will focus on each of the following elements which are outlined in more detail below:

- Reducing the need to travel
- Reducing travel distances - creating sustained, better quality employment locally
- 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
- Improving rail connectivity for passengers and freight
- Parking management principles
- Reducing car trips

6.5.6 It is anticipated that all of the above can be combined into an overall service package for Gravity, that can be provided to users via Mobility as a Service (MaaS).

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.
- Up to 750 residential units are to be delivered that are intended to primarily serve as housing for employees at the site.
- The campus could include live-work units and / or 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 between 4,000 and 7,500 new green-collar 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 high-quality highway improvements as part of the site access strategy, 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.

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Introducing New and Innovative Micromobility Measures

- Implementing micromobility solutions 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)[4] 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.
- 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, 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 with NH.

Parking Management Principles

- Opportunities will be sought to develop consolidated parking hubs to make efficient use of land, integrate EV charging, and reduce the visual impact of parking.
- 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.

[4] *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.*

- 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.
- Flexible design of parking hubs to enable the potential for land to be re-purposed in the future.
- A Car Parking Management Plan (CPMP) will also be prepared as set out within the FTP.

Site Wide Travel Plan and Travel Planning

- 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)

6.5.7 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 in **Figure 6-1**.

Figure 6-1 Potential Gravity MaaS package

6.5.8 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.

6.5.9 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.

6.5.10 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.

6.6 Site Access

Primary Vehicle Access

6.6.1 The Transport and Movement – Strategic Parameter Plan in **Appendix H** indicates the location of the site access proposals which are described below.

6.6.2 Primary access to the site for all vehicular traffic will be provided by the Gravity Link Road scheme which will be delivered in October / November 2021. A general arrangement drawing of the Gravity Link Road scheme is provided in **Appendix E**.

6.6.3 The Gravity Link Road will provide a new two-way single carriageway access road from the site via a new at-grade 4-arm roundabout on Woolavington Road on an alignment to the east and south of Puriton Village, crossing Hillside and connecting to the A39 Puriton Hill with another new at-grade roundabout.

6.6.4 The Gravity Link Road will provide direct and attractive access to the M5 motorway via Junction 23 and the A38 Major Route via the Dunball Roundabout.

6.6.5 As part of the Gravity Link Road proposals, the existing priority junction of Hillside / A39 is to be closed to vehicles, with access south of the new access road restricted to pedestrians, cyclists, equestrians and farm vehicles for field access.

6.6.6 South of Woolavington Road, the access road will cross the existing highway at Hillside where a new priority junction will be provided with a right-turn ghost lane to allow access and egress to and from the existing residential area of Puriton Park.

6.6.7 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.

6.6.8 The potential need for site security and access into the site will be determined by the requirements of the end occupier(s). If required, details will be developed and submitted as part of future compliance applications, along with other details demonstrating how the primary access road will route further throughout the site.

Secondary Vehicle Access

6.6.9 Secondary site access requirements for Gravity will largely be driven by the needs of end occupiers and therefore be proposed in detail as part of future LDO Compliance Applications. Notwithstanding, several potential options are identified in this TA which have been the subject of technical investigation to demonstrate feasibility and compliance with appropriate highway design standards.

Eastern Site Access

6.6.10 **Appendix C - Drawing 332310102/5505/102** illustrates a potential Eastern Secondary Site Access on Woolavington Road. This junction could be positioned close to the south east boundary of the site.

6.6.11 The drawing demonstrates that a new simple priority T junction can be provided in accordance with the highway design guidelines set out in the Manual for Streets. The junction can achieve 2.4m x 43m horizontal visibility splays from the minor arm in both directions along Woolavington Road, utilising land forming the adopted highway or which is under the applicant's control. These visibility splays are based on the introduction of a speed limit change on Woolavington Road which would involve reducing the national speed limit to 30mph.

6.6.12 The priority T junction is shown to include a 5.5m wide site access road with a 2m wide footway on the western side and a 4.5m wide segregated foot / cycleway on the eastern side of the carriageway. It will also tie into the VES proposals which are due to come forward in the future.

6.6.13 An Autotrack assessment has been undertaken to demonstrate that the priority T junction layout can accommodate the swept path analysis generated by all appropriate vehicle types including refuse vehicles. The results of the assessment are illustrated in **Appendix C - Drawing 332310102/5505/202.**

Western Site Access

6.6.14 **Appendix C - Drawing 332310102/5505/101** illustrates a potential Western Secondary Site Access on Woolavington Road.

6.6.15 The drawing demonstrates that a new simple priority T junction can be provided in accordance with the highway design guidelines set out in the Manual for Streets. The junction can achieve 2.4m x 43m horizontal visibility splays from the minor arm in both directions along Woolavington Road, utilising land forming the adopted highway or which is under the applicant's control. These visibility splays are based on the introduction of a speed limit change on Woolavington Road which would involve reducing the national speed limit to 30mph.

6.6.16 The priority T junction is shown to include a 5.5m wide site access road with a 2m wide footway on the eastern side and a 4.5m wide segregated foot / cycleway on the western side of the carriageway. It will also tie into the VES proposals which are due to come forward in the future.

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6.6.17 An Autotrack assessment has been undertaken to demonstrate that the priority T junction layout can accommodate the swept path analysis generated by all appropriate vehicle types including refuse vehicles. The results of the assessment are illustrated in **Appendix C - Drawing 332310102/5505/201**.

Eastern and Western Approach Site Access

6.6.18 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.

6.6.19 The Eastern and Western Approach access junctions are shown as being retained in the parameter plan as it is unclear at this time whether they will ultimately be required. If end occupier requirements dictate that they are needed, it is likely that the junctions could need some level of improvement subject to the type and intensity of use proposed. This would be considered further as part of future compliance applications.

Emergency Access

6.6.20 A secondary vehicular access currently connects the site with the B3139 to the east. This is proposed to be retained for emergency, operations, pedestrian and cycle access only.

Off-Site Pedestrian, Cycle and Micro Mobility Access Proposals

6.6.21 Walking, cycling and the emerging Micro Mobility modes can offer a real alternative to the private car for short distance trips and play an important role in public transport journeys. The provision of infrastructure for these modes is therefore a central component of the access and movement strategy and key to establishing a sustainable travel culture at the site.

6.6.22 Discussions with SCC officers have taken place in respect of wider off-site connections including toward Bridgwater Town Centre and Bridgwater Train Station as part of a Gravity offsite Pedestrian, Cycle and Micro Mobility (PCMM) strategy.

6.6.23 Although not lawful to use on public highways at present (i.e. on highways, adopted footways, cycleways and the like), the growth of personal transport modes is likely to see changes to the way that these are used.

6.6.24 There are numerous emerging technologies in this sector, and some of the current potential favourites are reviewed below. Some of these are relatively commonplace, and available to buy from a range of outlets – others are new innovations and are somewhat unproven – but show the trend towards ever more niche focussed devices.

- Push Scooters – affordable, easy to ride, portable and carryable but small wheels are a limitation;
- Electric Scooters – affordable for electric power, easy to ride, easy to recharge, portable and carryable, but small wheels and limited range are a limitation;
- Electric Skateboard – range 6-12 miles, can cope with 1 in 4 gradient, enjoyable to ride, can be used with or without power, however can be challenging in wet conditions and small wheels means a smooth surface is required;
- Electric Bike – range generally between 30-50 miles, comfortable to ride, can be used with or without power, versatile but heavy, needs somewhere safe to be left and relatively expensive;

- Electric Moped Scooter – range 30-50 miles, easier maintenance than a traditional scooter, quiet, but may require a license, bulky, needs to be locked outside and limited space for luggage;

- Hoverboard – range of roughly 12 miles, easy to master, affordable, but not all are waterproof and not as fast or versatile as other modes; and

- Segway – range of 40 miles, handlebars make them easy to ride, enough around to be considered safe and reliable, but bulky, slow and less versatile than other options.

6.6.25 Design of infrastructure for any of the above will need to consider legal speed limits and how these may evolve in the future.

6.6.26 All of the primary and secondary vehicle access junctions explained previously will incorporate high quality infrastructure provision to facilitate and encourage pedestrian, cycle and Micro Mobility travel.

6.6.27 The access points to the south of the site provide for direct connectivity into the VES proposals and onward travel into the villages of Woolavington and Puriton and beyond.

6.6.28 In addition, there is scope to provide an additional access for these modes at the western edge of the site to connect onwards into Puriton village via Middle Street. This may necessitate delivery of supporting highway safety improvements along sections of this route to make best use of existing infrastructure and to ensure safe crossing facilities are accommodated where necessary. Any requirement for this additional route remains subject to further review as part of future compliance applications when more detail is available regarding the on-site development layout and associated travel demands.

6.6.29 The existing connection between the western edge of the site and Middle Street, is an existing adopted rural track which varies in width between 5.1m and 10.0m and is not shown to be surfaced. It is considered that the existing track provides access for agricultural vehicles to access the existing fields, which will need to be retained as part of the access proposals. The potential improvements to the existing adopted track include:

- Provide a 5.0m segregated foot/cycleway along the majority of the route, with connection into Gravity.

- Where the width of the highway cannot accommodate a segregated foot/cycleway, a section of shared foot/cycleway could be provided as a transition to Middle Street.

- The existing junction of Middle Steet and Rookery Close could be provide as a raised table-top priority junction.

- A pedestrian route to the table-top junction could be provided as an at-grade footway, with hazard warning tactile paving provided to denote edge of footway, with connection across the raised junction to the existing footway along Middle Street and Rookery Close.

- It is considered that cyclists could join the raised carriageway from the shared foot/cycleway transition and continue on-carriageway along Middle Street.

- Connections to the existing field access could be retained, with agricultural vehicles permitted to travel along the segregated foot/cycleway.

- In order to restrict the site access to non-vehicular traffic, it is considered that lockable bollards could be provided.

- The bollards can either be located at the connection between the rural track and Middle Street, which would require agricultural vehicles to unlock the bollards but would prevent other vehicle traffic from using the track.

- Alternatively, the bollards could be located near to the site boundary so access is retained to the fields without restrictions, but this could lead to misuse of the track.

6.6.30 Middle Street provides a connection to Puriton village, and ties into Woolavington Road at the junction with the Rye. Middle Street is considered to be a quiet, low trafficked 'green lane', which is lit and provides a footway along the majority of its length. Middle Street is approximately 500m in length with two sections of approximately 60m and 180m where no footway is provided, in keeping with its rural character. As agreed with SCC, a 'green lane' doesn't require a separate footway, but can be used with pedestrians and cyclists within the carriageway, such as along Pawlett Road and Downend Road.

6.6.31 If deemed required, measures to highlight the presence of pedestrians, such as a 'virtual footway' or change of surfacing could be provided, whilst retaining the rural character of the area. Pedestrian access to Woolavington Road is also provide via Canns Lane and Culverhay Close, therefore providing a shorter distance where no footway is provided.

6.6.32 Formalising Middle Street has not been considered, due to the limited width, and therefore standard carriageway geometry could not be provided. Also, it is considered that a formalised highway layout could detriment the existing character of Puriton Village and encourage increased vehicle speeds. However, there are other potential measures such as, sympathetic wooden bollards to denote the carriageway edge and provide additional space for pedestrians, a change of surfacing in key locations to raise awareness of village location or planting and/or emphasizing local distinctive features within the village, such as build-out around the key historical buildings.

6.6.33 The requirement to introduce new measures to Middle Street and onward connection from the site to Puriton would be subject to further review as part of any future LDO Compliance Application.

Connections to Bridgwater Town Centre

6.6.34 In consultation with SCC officers, the Gravity PCMM Strategy has identified a key route from the site to the Town Centre, via the A38. The route is proposed to utilise the Gravity VES proposals through Puriton, connecting to the existing Bridleway bridge over the M5 to Downend. From Downend Road, a controlled crossing of the A38 could be provided to connect PCMM users to the SCC proposed foot/cycleway improvements along the A38, south to Dunball Roundabout.

6.6.35 The existing bridleway bridge over the M5, connecting Riverton Road to Pawlett Road is approximately 100m in length. The width of the bridge between kerbs is 3.1m and 4.4m between the parapets, which are approximately 1.85m high. Lighting is provided at either end of the bridge, with a lighting column provided at the location the bridge ties into the existing footway along Pawlett Road, and another lighting column located to the east, at the top of the sloped access from Riverton Road. There is approximately 95m spacing between the existing lighting columns.

6.6.36 Access to the bridge from Riverton Road, is via an existing slope which rises up to the bridge level, and due to an existing private drive-way constraint in this location it is considered that the gradient could not be increased.

6.6.37 No improvements are proposed for this existing link including the existing bridge over the M5; it is noted through discussions with NH and SCC officers that potential improvements may be sought, although it is considered this should remain subject to review as part of any future LDO Compliance Application(s) and when further details are available regarding future occupiers.

6.6.38 Along the A38, south of Dunball Roundabout, SCC are undertaking a review of HPC's Element 2 Scheme which provided a shared foot/cycleway along the A38 between Express Park and Dunball Roundabout. SCC are undertaking a review to understand what improvements can be proposed to provide the scheme is in accordance with DfT's Local Transport Note 1/20 'Cycle Infrastructure Design', July 2020. Whilst these works are on-going, SCC confirmed that a shared foot/cycleway (approximately 2.5m wide), will be delivered as the minimum level of pedestrian and cycle improvements along the A38.

6.6.39 The route along the A38 becomes constrained south of the junction with Wylds Road due to the existing limited highway land and third-party frontages. HPC's Element 3 Scheme therefore considers a shared foot/cycleway along the River Parrett to the Town Centre Scheme. Whilst these works have not been delivered to date, SCC confirmed that this route will be delivered with view to a connection to SDC's Celebration Mile via Bridgwater Docks.

6.6.40 There could be an opportunity for the Gravity proposals to support delivery of the SCC improvements along the A38 corridor and subject to the outcomes of SCC's ongoing review, delivery of this could potentially be supported through an allocation of retained business rates via the Locality Investment Plan process as explained further in Chapter 9.

Connections to Bridgwater Train Station

6.6.41 Due to existing constraints along the A38, the PCMM route is proposed to divert along the River Parrett to provide a continuous route to the Town Centre, which creates an indirect route to Bridgwater Train Station from the site. Therefore, an alternative route, consisting of a continuous PCMM route, could be provided to Bridgwater Train Station, to the east of the A38, via Kings Drive.

6.6.42 Following discussions with SCC officers, it could be possible to connect PCMM users to Kings Drive via an improved crossing on the A38 north arm of the Kings Drive roundabout. The PCMM route could utilise the existing segregated pedestrian and cycle infrastructure along Kings Drive to the A39, with an existing signalised crossing providing a connection onto the shared foot/cycleway along the southern edge of the A39. A shared foot/cycleway along the A39 could be delivered, to connect to Parkway. Whilst this remains subject to ongoing design review, it is expected to require consideration of:

- The existing 3.0m shared foot/cycleway, with no separation strip, ends approximately 50m west of the junction of A39 Bath Road / Kings Drive.
- To widen the existing footway to provide a 3.0m shared foot/cycleway, narrow carriageway through reduction of central hatching, providing a minimum carriageway width of 6.4m and a foot/cycleway width of 3.0m
- Due to the limited highway land available, no separation to the carriageway can be provided, as the existing shared foot/cycleway along the A39 to the east of the junction of A39 Bath Road / Kings Drive.
- At the junction of A39 Bath Road / Parkway, the 3.0m shared foot/cycleway could either divert across an area Open Space or run along the carriageway edge to connect onto Parkway. The potential use of this land for pedestrian and cycle proposals has been agreed in principle with SDC.

- Across the Parkway arm, a raised pedestrian and cycle priority crossing could be provided, connecting cyclists into Bath Road service road, as a low trafficked quiet street.

- Cyclists can continue on-carriageway along Bath Road with a raised pedestrian and cycle priority crossing of Trevor Road.

6.6.43 To the west of Trevor Road, PCMM users could then utilise the existing low trafficked quiet streets of Bath Road, Frederick Road and Fairfax Road providing a route to the south, which connects to Piggy Lane. Piggy Lane provides an existing segregated foot/cycle path to Bridgwater Train Station. SCC have identified an improvement scheme for Piggy Lane which is not currently funded.

6.6.44 There could be an opportunity for the Gravity proposals to support delivery of these potential improvements along the A39 and Piggy Lane for routes to Bridgwater Train Station and subject to further design review and preparation of a full scheme designs, delivery of these proposals could also be supported through an allocation of retained business rates via the Locality Investment Plan process as explained further in Chapter 9.

6.7 Bus Service Proposals

6.7.1 The Gravity blueprint for a smarter, cleaner future embraces attractive and sustainable travel alternatives to the private car with a Passenger Transport Strategy that is designed to encourage mode shift and travel behaviour change. The Strategy seeks to identify places with a critical mass of population where bus services could provide fast, direct and reliable links to Gravity and then to develop service offers that are operationally efficient, commercially attractive and financially sustainable.

6.7.2 The Strategy is consistent with the National Bus Strategy, Bus Back Better, and SCC's emerging BSIP. It consists of a mix of scheduled fixed timetable services for core corridors where demand is strongest and flexible demand responsive operations where demand is lower or more diffuse. In both cases, services will be operated by high quality vehicles with features such as real time tracking and free on-board Wi-Fi. Services will be direct with fast journey times, supported by strong marketing and information.

6.7.3 At this stage, the strategy has been developed based on modelled demand forecasts and which are necessarily indicative rather than prescriptive. The specific proposals will be refined and updated to reflect the characteristics and travel needs of the eventual workforce as part of future LDO Compliance Applications and will be informed by discussions with prospective occupiers once these are known as well as key stakeholders. Outline proposals will also need be tested in respect of forecast uptake, mode shift and financial performance to optimise the operational offer.

6.7.4 The indicative service proposals outlined at this stage and included are as follows:

- Timetabled service G1 operating between Bridgwater, Gravity and Street and also serving Puriton and Woolavington

- Timetabled service G2 operating between Burnham, Highbridge and Gravity and also serving Woolavington.

- Demand responsive services from western and southern estates in Bridgwater, including Northfield, Haygrove, Wembdon and Hamp, and extending to North Petherton.

- Other demand responsive services as required to support travel from villages to the north and east around the Gravity site.

6.7.5 Times of operation and service frequencies would be dependent on shift patterns and working hours on site.

6.7.6 It is anticipated that the Gravity Passenger Transport Strategy proposals could be funded through an allocation of retained business rates via the Locality Investment Plan process as explained further in Chapter 9.

6.8 Car Parking Management Plan

6.8.1 A Car Parking Management Plan (CPMP) will be prepared as part of any future LDO Compliance Application.

6.8.2 Gravity recognises that limiting car parking availability can play a key role in reducing the traffic impacts associated with the development proposal and supporting the overall Gravity development vision for clean and sustainable growth.

6.8.3 Any reduction in levels of car parking provision will need to be part of a balanced approach incorporating the parallel delivery of sustainable transport improvements to facilitate access to the site by non-car modes. Consideration will also need to be given around how this works in practice including managing access to parking at shift change over for example.

6.8.4 This includes extensive sustainable transport improvements specifically identified to support the development, together with broader area-wide transport improvements being delivered by a range of stakeholders. These improvements will be delivered over time and some will take several years to be completed and improvements for non-car modes to be fully realised.

6.8.5 An important aspect to consider is the expectation of prospective employment occupiers and a need to ensure that the development proposal provides sufficient car parking to attract incoming occupiers, whilst retaining the overarching transport objective of limiting reliance on travel by car.

6.8.6 It will also be important to consider the management of any potential implications of managing car parking on the areas around the site. For example, 'fly parking'.

6.8.7 Further details on the proposed content for the CPMP is set out in Section 4 of the FTP.

6.9 Summary

6.9.1 The Gravity development proposals seek to inherently manage travel demands through the delivery of a mix of land uses supporting the primary employment site, these include:

- a commitment to manage shift patterns to maximise sustainable travel opportunities for employees and limit residual traffic impacts in the traditional network AM and PM peak periods.
- Provision of supporting (e.g., retail, leisure, health) land uses specifically for employees and/or on-site residents (with the exception of the 37 Club retained for wider community use/access in line with existing arrangements).
- Residential development for on-site employees and to be subject to appropriately worded conditions linking occupation to employment on site.

6.9.2 Gravity will embrace the latest thinking in mobility solutions, allowing smarter and people focused movement through the site while creating flexible and efficient plots. Therefore, the access, transport and mobility strategy for Gravity responds to both existing conditions and emerging travel trends such as those explained earlier in this report, and the measures

required to achieve the trip generation and modal share expected to reflect the defined 'core scenario' for this Gravity LDO assessment have been set out.

6.9.3 Within the development the campus will be designed to prioritise the use of sustainable modes of transport, including the potential reinstatement of rail access for both passenger and freight services.

6.9.4 Off site, proposals will ensure that there are attractive provisions to encourage walking, cycling, Micro Mobility and public transport trip making. Discussions with SCC officers have also taken place in respect of wider off-site connections including toward Bridgwater Town Centre and Bridgwater Train Station as part of a Gravity offsite PCMM strategy.

6.9.5 The indicative bus service proposals outlined at this stage are as follows, with times of operation and service frequencies would be dependent on shift patterns and working hours on site:

- Timetabled service G1 operating between Bridgwater, Gravity and Street and also serving Puriton and Woolavington
- Timetabled service G2 operating between Burnham, Highbridge and Gravity and also serving Woolavington.
- Demand responsive services from western and southern estates in Bridgwater, including Northfield, Haygrove, Wembdon and Hamp, and extending to North Petherton.
- Other demand responsive services as required to support travel from villages to the north and east around the Gravity site.

6.9.6 A CPMP will be prepared as part of any future LDO Compliance Application. Further details on the proposed content for the CPMP is set out in Section 4 of the FTP.

6.9.7 The FTP provides the approach for active mobility management measures to be implemented to carry this through to the operational phases of the development, and provisions on site are adaptable to make the most of future changes in travel trends and technological advancements.

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7 Transport Appraisal Methodology

7.1 Introduction

7.1.1 This chapter describes the appraisal methodology that has been developed to assess the Gravity development and which takes account of the following:

- The LDO route being followed offers significant flexibility over the final development mix which will be market led.
- The large scale and atypical nature of the development proposed.
- The SDC Transport Model tool being unsuitable for full use at the time of the LDO application.

7.1.2 This part of the assessment will demonstrate the Proposed Development impact on the transport network overall as well as the roads surrounding the Site in the traditional weekday AM and PM peak hours.

7.1.3 The scope of the assessment also reflects the peak hour traffic generation of the HEP Extant Consent as set out in Section 1.2, and the comparative impacts of the LDO.

7.1.4 The peak hour light vehicle traffic generation demands have been calculated by the bespoke Scenario Testing tool that has been developed specifically for this LDO and reflects the transport proposals for the Site as set out in Section 6. The HGV traffic generation has been forecast using an alternative methodology which has also been described in this section.

7.1.5 The impact assessment results are set out for two Gravity scenarios – the Core and BAU scenarios (set out in Section 5) – with the former being the primary focus and the latter specifically requested by SCC / NH. The Gravity impacts are also compared against the impacts associated with the HEP Extant Consent. As described previously, whilst it is an aspiration to deliver rail access, the Gravity impacts assessed do not include any potential reduced traffic generation benefit that could be realised if the Gravity rail link is reinstated for passenger and freight use.

7.1.6 To carry out this assessment, a 2032 future base year has been created through the allowance of projected background traffic growth, and the addition of committed development and Hinkley Point C trip generations. The key assumptions associated with these are set out in this chapter.

7.1.7 The assessment does not take specific account of traffic reassignment effects or peak hour spreading during congested peaks that could reduce the impacts presented, thereby reflecting a robust assessment in terms of peak hour junction impacts..

7.1.8 The assessment methodology adopted as explained in this chapter is robust and appropriate given the current stage of the LDO process. It has allowed us to identify the potential need for future highway mitigation which is captured in Chapter 9, although the need for mitigation should be considered in the context of the comparable impact between the Gravity Core Scenario and the HEP Extant Consent scenario.

7.2 Study Area

7.2.1 The traffic impact study area and scope for assessment was discussed with the highway authorities during pre-application scoping discussions.

7.2.2 The traffic impact study area includes the following specific junctions:

- Gravity Site Access / Woolavington Road roundabout
- A39 Puriton Hill / Gravity Link Road roundabout
- M5 Junction 23
- A38 Dunball roundabout

7.3 2018 Base Year

7.3.1 Due to the limitations on movement implemented by the Government in response to the Covid-19 pandemic, and given there is an imminent change to the local highway network with the Gravity Link Road soon to open, 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).

7.3.2 On this basis, 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.

7.3.3 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 a localised reassignment of Woolavington Road traffic to use the Gravity Link Road (as opposed to routing toward the A39 via Puriton) has been derived.

7.3.4 The following datasets have been used to create the 2018 base year:

- 2018 junction turning counts for M5 Junction 23, A38 Dunball Roundabout and A39 Puriton Hill / Hall Road junction (provided by NH).
- 2018 Automatic Traffic Counter data for the minor road network within the study area.
- 2011 junction turning counts (A39 / Puriton Hill only) used within the approved assessments for the 2017 Planning Consent.

7.3.5 Prior to 2018, M5 Junction 23 was modified and upgraded to signal control through the mitigation agreed for the Hinkley C project to create additional capacity. Since the improvement works were completed prior to the Junction 23 base traffic counts being undertaken in anticipation of the additional traffic that could be generated by the Extant Consent, the impact of the junction upgrade is inherent within the 2018 baseline flows recorded at this junction.

7.3.6 The as-built General Arrangement plan for the scheme, as provided by NH, is included in **Appendix I**.

7.3.7 It is recognised that updated baseline traffic data to respond to the limitations explained above will be required as part of future LDO compliance applications and supporting TA's.

7.3.8 2018 base year traffic flow diagrams for the weekday AM and PM peak hours are included as **Appendix B - TF1 a/b** and **TF2 a/b**.

7.4 Forecast Assessment Years and Modelled Traffic Scenarios

Forecast Assessment Years

7.4.1 The impact of new development on the transport network needs to be considered in the future and therefore the 2018 baseline traffic flows have been adjusted to represent likely future conditions in a 2032 forecast completion year:

7.4.2 The 2032 forecast year has been identified as 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. This year also accords with another requirement of DfT Circular 02/2013 as explained in paragraph 25: *"The overall forecast demand should be compared to the ability of the existing network to accommodate traffic over a period up to ten years after the date of registration of a planning application or the end of the relevant Local Plan whichever is the greater. This is known as the review period".*

7.4.3 DfT Circular 02/2013 further sets out the following relevant paragraphs in relation to the assessment of development impact, which will be considered further in subsequent chapters of the TA:

- Paragraph 26: *"The Highways Agency expects the promoters of development to put forward initiatives that manage down the traffic impact of proposals to support the promotion of sustainable transport and the development of accessible sites. This is particularly necessary where the potential impact is on sections of the strategic road network that could experience capacity problems in the short or medium term".*

- Paragraph 27 states the following: "*Where the overall forecast demand at the time of opening of the development can be accommodated by the existing infrastructure, further capacity mitigation will not be sought".*

- Paragraph 33: *"Only after travel plan and demand management measures have been fully explored and applied will capacity enhancement measures be considered. While capacity enhancements should normally be addressed at the plan making stage, such measures may be considered at the time when individual planning applications are submitted, subject to the over-riding principle that delivery of the adopted Local Plan proposals should not be compromised".*

- Paragraph 34: "*Where insufficient capacity exists to provide for overall forecast demand at the time of opening, the impact of the development will be mitigated to ensure that at that time, the strategic road network is able to accommodate existing and development generated traffic. Any associated mitigation works should be appropriate to the overall connectivity and capacity of any affected part of the strategic road network".*

7.4.4 An additional 2024 forecast year has also been generated for further assessment where potential peak period capacity constraints have been identified on the basis that this is estimated as the likely year of opening (i.e., first occupation of the development and accords with the requirements set out in paragraph 27 of the DfT Circular 02/13 which NH will use to assess the development).

7.5 Development of 2024 Future Base Year

7.5.1 The 2024 future year base flow scenarios have been developed from the 2018 base by taking account of the following:

- Projected TEMPro growth in background traffic levels and 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.

- Hinkley Point C construction phase traffic (but not operational for reasoning that is provided later).

Committed Development

7.5.2 The ES Scoping consultation identified the need for four specific committed development sites to be taken into consideration, including:

- 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

7.5.3 It has been assumed that all four sites will be delivered by 2024. The following vehicle trip generations, sourced from the respective TA's where different trip rates per dwelling were used, have been explicitly modelled as shown in **Table 7-1**.

Site Application Ref	Weekday AM In	Weekday AM Out	Weekday PM In	Weekday PM Out
42/20/00014	19	49	42	24
54/19/00008	24	55	54	24
54/19/00009	22	65	54	27
54/19/00010	14	38	35	18

Table 7-1 Committed development weekday peak hour vehicle trip generations explicitly modelled

7.5.4 The vehicle trips generated by each committed development site have been distributed and assigned to the road network using the same methodology as adopted for Gravity.

7.5.5 Committed development traffic flow diagrams for the weekday AM and PM peak hours are included as **Appendix B - TF3 a/b** through to **TF12 a/b**.

TEMPro Growth

7.5.6 TEMPro Version 7.2 software has been used to calculate traffic growth factors for the weekday AM and PM peak hours for motorway, principal and minor road types.

7.5.7 The default planning assumptions in terms of jobs and households for the Sedgemoor zone were reviewed and adjusted based upon information set out in the SDC Local Plan (adopted version 20th February 2019) and its evidence base.

7.5.8 The SDC Local Plan confirmed the following:

- The need to deliver 13,500 new households between 2011-32
- The need to create 9,795 jobs between 2011-32

- This equates to a need to deliver 644 new households and create 466 new jobs per annum throughout the 2011-32 Local Plan period

7.5.9 It has been assumed that Sedgemoor has delivered 4,508 new households (i.e., 7 * 644) and created 3,262 new jobs (i.e., 7 * 466) during the 7-year period between 2011 and 2018.

7.5.10 It has been further assumed that Sedgemoor will deliver 3,864 new households (i.e., 6 * 644) and create 2,796 new jobs (i.e., 6 * 466) during the 6-year period between 2018 and 2024.

7.5.11 The default planning assumptions for Sedgemoor in year 2011 were therefore adjusted as shown in **Table 7-2**.

Year	Planning Assumptions Type	Sedgemoor Households	Sedgemoor Jobs
2011	TEMPro Default	48,961	48,992
2018	User adjusted	53,469	52,254
2024	**User adjusted**	**57,333**	**55,056**

Table 7-2 TEMPro planning assumptions adjustments (2024 assessment)

7.5.12 The SDC Local Plan document confirms that the Gravity EZ has not been included in the 2011-32 growth targets because: *"there cannot be an over reliance on a single site or a single sector in setting employment provision"*. No further adjustment to the planning assumptions has been necessary in response to the Gravity proposals.

7.5.13 Further adjustments to the planning assumptions were however undertaken to prevent the 'double counting' of traffic that would be generated by the four committed development sites above where specific weekday peak hour traffic generations have been explicitly modelled.

7.5.14 The SDC Local Plan confirms that the villages of Puriton and Woolavington are classified as Tier 2 settlements and are planned for growth in the order of 163 and 225 dwellings respectively. The committed development sites equate to totals of 120 dwellings in Puriton and 395 in Woolavington.

7.5.15 The 2024 user adjusted figure for Sedgemoor households as shown in **Table 7-2** has been reduced by a further 120 dwellings for Puriton and 225 dwellings for Woolavington. The resulting adjusted figure is shown in **Table 7-3**.

Year	Planning Assumptions Type	Sedgemoor Households	Sedgemoor Jobs
2024	User adjusted – as per Table 7-2	57,333	55,056
2024	**Final user adjusted**	**56,988**	**55,056**

Table 7-3 TEMPro planning assumptions adjustments (2024 assessment)

7.5.16 **Table 7-4** contains the 2018-24 traffic growth factors have been calculated using TEMPro and applied to the 2018 base flows. These have been calculated using the final adjusted planning assumptions set out in **Table 7-2** and have also been further adjusted for NTM traffic growth projections.

Road Type	Time Period	Factor
Motorway	Weekday AM Peak	1.128
	Weekday PM Peak	1.124
Principal	Weekday AM Peak	1.082
	Weekday PM Peak	1.078
Minor	Weekday AM Peak	1.080
	Weekday PM Peak	1.077

Table 7-4 TEMPro 2018-24 traffic growth factors

Hinkley Point C

7.5.17 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 2016[5]. Press statements from EDFE confirm that Hinkley Point C is anticipated to be completed around June 2026[6], with the former position being 2025 in line with the energy white paper.

7.5.18 It is therefore appropriate for the 2024 future baseline traffic flows to include movements generated by Hinkley Point C during the construction phase as it is not expected to be completed until 2026. All Hinkley Point C traffic movements related to the construction phase are inherently included within the 2018 baseline traffic flows used within this assessment.

7.5.19 The assumed Hinkley Point C construction traffic flows (all vehicles) are shown in addition to the 2018 base in **Appendix B - TF13 a/b** and **TF14 a/b**.

Highway Improvements

7.5.20 The A38 Dunball roundabout was identified for improvement as part of the Extant Consent. An improvement scheme is identified in the Extant Consent Section 106 but it has not been delivered to date. However, SDC has identified the capacity of this junction as a longstanding constraint to broader development growth in Bridgwater and has committed to forward fund the delivery of the improvement scheme to unlock development.

7.5.21 There is not a final approved scheme for Dunball roundabout at the time of preparing this TA, however discussions with SDC and SCC confirmed that a scheme comprising of a throughabout layout is undergoing final technical review. The most recently available

[5] https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/about

[6] 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.

throughabout scheme plan is included in **Appendix J** and for the purposes of this TA, is assumed to be delivered before 2024.

7.6 Development of 2032 Future Year Base

7.6.1 The 2032 future year base flow scenarios have been developed from the 2018 base by taking account of the following:

- Projected TEMPro growth in background traffic levels and 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.
- Hinkley Point C operational phase traffic (but not construction since this would be complete by 2026).

Committed Development

7.6.2 The four committed development sites mentioned previously have been assumed to be delivered by 2024 to provide a robust assessment of base trips.

7.6.3 Committed development traffic flow diagrams for the weekday AM and PM peak hours are included as **Appendix B - TF3 a/b** through to **TF12 a/b**.

TEMPro Growth

7.6.4 TEMPro Version 7.2 software has been used in the same manner as the 2024 base to calculate traffic growth factors for the weekday AM and PM peak hours for motorway, principal and minor road types.

7.6.5 The default planning assumptions for Sedgemoor in year 2011 were adjusted as per the methodology explained previously for the 2024 base. **Table 7-5** includes the adjusted planning assumptions for 2032 as well as the other years discussed previously.

Year	Planning Assumptions Type	Sedgemoor Households	Sedgemoor Jobs
2011	TEMPro Default	48,961	48,992
2018	User adjusted	53,469	52,254
2024	User adjusted	57,333	55,056
2032	**User adjusted**	**62,485**	**58,787**

Table 7-5 TEMPro planning assumptions adjustments (2032 assessment)

7.6.6 Further adjustments to the planning assumptions (using the same methodology as explained previously for the 2024 base) were undertaken to prevent the 'double counting' of traffic that would be generated by the four committed development sites above where specific weekday peak hour traffic generations have been explicitly modelled.

7.6.7 The 2032 user adjusted figure for Sedgemoor households as shown in **Table 7-5** has been reduced by a further 120 dwellings for Puriton and 225 dwellings for Woolavington. The resulting adjusted households figure is shown in **Table 7-6**.

Year	Planning Assumptions Type	Sedgemoor Households	Sedgemoor Jobs
2032	User adjusted – as per Table 7-5	62,485	58,787
2032	**Final user adjusted**	**62,140**	**58,787**

Table 7-6 TEMPro planning assumptions adjustments (2032 assessment)

7.6.8 **Table 7-7** contains the 2018-32 traffic growth factors have been calculated using TEMPro and applied to the 2018 base flows. These have been calculated using the final adjusted planning assumptions set out in Table 7-6 and have also been further adjusted for NTM traffic growth projections.

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

Table 7-7 TEMPro 2018-32 traffic growth factors

Hinkley Point C

7.6.9 It has been necessary for the 2032 future baseline traffic flows to include movements generated by Hinkley Point C during the operational phase, but to exclude all movements related to the construction phase which are inherently included within the 2018 baseline traffic flows used for construction activity in that year.

7.6.10 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).

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7.6.11 The likely weekday peak hour operational traffic impact associated with Hinkley Point C was assessed within the Extant Consent TA and the source data used at that time was supplied by SCC. For the purposes of this assessment, the same Hinkley Point C operational traffic movements assessed previously have been incorporated into the 2032 baseline for this assessment (see **Appendix B - TF15 a/b** and **TF16 a/b** for the resulting flow diagrams).

Highway Improvements

7.6.12 The 2032 base traffic flows assume that the previously mentioned highway schemes including the Gravity Link Road (due to be completed in October / November 2021), M5 Junction 23 (built) and A38 Dunball Roundabout (planned and funded) are all delivered.

7.7 HEP Extant Consent Travel Demands

7.7.1 The 2024 and 2032 base are also intended to represent what is likely to happen to the environment incorporating the HEP Extant Consent (but excluding the safeguarded energy land uses), the Gravity Link Road and the VES, in addition to the current approach to transport forecasting and changes in travel trends. This will allow the transport impacts of Gravity to be readily compared against the HEP Extant Consent.

7.7.2 The HEP travel demand has been forecast for the 2024 and 2032 future years based upon the methodology described in Chapter 5 and to align with the adopted assessment scenarios.

7.7.3 The HGV demands for HEP have been estimated by revisiting the technical assessments underpinning the approved TA work and further details are set out below.

7.7.4 The approved HEP TA calculated HGV trip generation for the B8 storage and distribution uses only for the HEP scheme. **Table 7-8** shows the resulting HGV trip generation for the weekday AM and PM peak hours.

	AM Arr	AM Dep	AM Total	PM Arr	PM Dep	PM Total
Trip Generation	62	80	142	39	30	69

Table 7-8 HEP HGV trip generation for weekday peak hours

7.7.5 The analysis undertaken has also demonstrated that a total of 445 and 481 HGVs could be generated by the HEP scheme during a typical day.

7.7.6 The HEP traffic flows expressed as total vehicles and HGV only are included in **Appendix B - TF17 a/b** and **TF18 a/b**, and **TF 19 a/b** and **TF20 a/b**, respectively.

7.7.7 The resulting non-HGV multi-modal travel demands for HEP are set out in the tables below.

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Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	7	18	22	553	45	646
0600-0700	7	18	22	543	45	634
0700-0800	11	26	32	803	66	938
0800-0900	12	29	35	876	72	1023
0900-1000	8	20	25	623	51	728
1000-1100	2	5	6	156	13	183
1100-1200	1	3	4	98	8	115
1200-1300	2	5	7	165	14	192
1300-1400	4	10	13	312	26	365
1400-1500	7	17	21	521	43	609
1500-1600	1	3	3	84	7	98
1600-1700	1	3	4	98	8	115
1700-1800	4	10	13	317	26	370
1800-1900	1	2	2	52	4	60
1900-2000	0	1	1	36	3	42
2000-2100	0	0	0	0	0	0
2100-2200	0	0	0	0	0	0
2200-2300	0	0	0	0	0	0
2300-0000	0	0	0	0	0	0

Table 7-9 HEP Travel Demands – Inbound

DRAFT

Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	0	0	0	0	0	0
0600-0700	2	5	6	154	13	181
0700-0800	1	3	4	88	7	103
0800-0900	5	12	16	371	31	435
0900-1000	2	5	6	147	12	172
1000-1100	2	5	7	162	13	190
1100-1200	2	4	5	131	11	153
1200-1300	4	9	12	278	23	325
1300-1400	3	8	10	233	19	272
1400-1500	9	22	28	679	56	795
1500-1600	7	17	22	525	43	614
1600-1700	12	29	39	875	72	1026
1700-1800	11	27	36	818	67	959
1800-1900	7	18	24	543	45	636
1900-2000	3	7	9	221	18	258
2000-2100	0	0	0	0	0	0
2100-2200	0	0	0	0	0	0
2200-2300	0	0	0	0	0	0
2300-0000	0	0	0	0	0	0

Table 7-10 HEP Travel Demands – Outbound

DRAFT

Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	7	18	22	553	45	646
0600-0700	9	23	28	697	57	815
0700-0800	12	29	36	891	73	1041
0800-0900	17	41	50	1247	102	1458
0900-1000	10	25	31	770	63	900
1000-1100	4	10	13	318	26	372
1100-1200	3	8	9	229	19	267
1200-1300	6	15	18	443	36	518
1300-1400	7	18	22	545	45	637
1400-1500	16	39	49	1201	99	1404
1500-1600	8	20	25	609	50	712
1600-1700	13	32	43	873	80	1140
1700-1800	15	37	49	1134	93	1329
1800-1900	8	20	26	594	49	697
1900-2000	3	8	11	256	21	300
2000-2100	0	0	0	0	0	0
2100-2200	0	0	0	0	0	0
2200-2300	0	0	0	0	0	0
2300-0000	0	0	0	0	0	0

Table 7-11 HEP Travel Demands – Two Way Totals

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7.8 Gravity Travel Demands

7.8.1 The Gravity travel demand has been forecast for the 2024 and 2032 future years based upon the methodology described in Chapter 5 and to align with the adopted assessment scenarios.

7.8.2 The adopted methodology for deriving the Gravity travel demands has been developed in consultation with SCC and NH officers and the technical parameters set out through a series of technical notes prior to the preparation of this TA. The most recent of these technical notes, TN004: GRAVITY – Scenario Forecasting Tool: response to queries (Stantec, 21/09/2021) is provided at **Appendix K**.

7.8.3 The HGV demands for advanced manufacturing uses at Gravity have been estimated using a bespoke methodology developed for the purposes of the project and further details are set out below.

7.8.4 The following outputs (i.e., vehicles based on an electric vehicle production facility) have been assumed for the purposes of the assessment:

- Up to 445,000 units per annum output (informed by comparable site)
- 24/7 365 days per annum operation

7.8.5 Based on the above, Gravity could achieve 1,219 units output daily (445,000 / 365). However, this figure has been uplifted by 10% to reflect that this level of daily output could vary slightly on a daily basis. The uplifted output therefore equates to 1,341 units daily (1.1*1,219).

7.8.6 It is assumed that the output units would be moved by typical car transporter vehicles which accommodate up to 8 vehicles each. This assessment assumes that, on average, each transporter carries 6 rather than 8 vehicles.

7.8.7 The total estimated number of transporters thereby generated equates to 224 (i.e. 1,341/6), meaning there could be 224 arrival trips (empty transporters) and another 224 departure trips (loaded transporters) dealing with the advanced manufacturing outputs during a typical day.

7.8.8 In terms of advanced manufacturing inputs (i.e. supplies / materials etc), it is further estimated that another 224 arrival and 224 departure trips could be generated for such activities (i.e. a doubling of the above).

7.8.9 The Gravity advanced manufacturing uses, based on the analysis set out, are therefore estimated to generate a total of up to 896 HGVs (448 movements in, 448 movements out) over the course of a typical day. Based on the flat HGV movement profile assumed, these totals equate to approximately 38 two way HGV movements per hour for every hour during a typical day.

7.8.10 The Gravity Core Scenario traffic flows expressed as total vehicles and HGV only are included in **Appendix B - TF29 a/b** and **TF30 a/b**, and **TF31 a/b** and **TF32 a/b**, respectively.

7.8.11 The Gravity BAU Scenario traffic flows expressed as total vehicles and HGV only are included in **Appendix B - TF33 a/b** and **TF34 a/b**, and **TF35 a/b** and **TF36 a/b**, respectively.

7.8.12 The resulting non-HGV multi-modal travel demands for Gravity are set out in the tables below.

Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	19	163	248	1077	147	1654
0600-0700	3	23	35	157	23	242
0700-0800	4	30	45	220	42	340
0800-0900	7	57	86	414	74	638
0900-1000	4	34	49	253	47	386
1000-1100	1	9	12	94	27	144
1100-1200	1	8	10	93	34	146
1200-1300	2	15	16	152	39	224
1300-1400	20	166	249	1161	186	1782
1400-1500	3	25	37	227	65	357
1500-1600	2	8	15	184	119	328
1600-1700	2	13	14	188	85	303
1700-1800	4	27	24	162	67	384
1800-1900	2	8	8	128	58	204
1900-2000	1	2	5	88	58	153
2000-2100	1	1	3	63	42	110
2100-2200	18	157	241	1080	171	1667
2200-2300	3	18	29	165	51	266
2300-0000	0	0	0	7	5	13

Table 7-12 Gravity Core Scenario Travel Demands - Inbound

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Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	2	17	27	115	16	177
0600-0700	18	157	243	1060	156	1634
0700-0800	1	5	8	99	58	172
0800-0900	4	27	30	299	110	470
0900-1000	2	14	12	156	47	232
1000-1100	1	9	10	109	37	166
1100-1200	1	7	9	91	32	140
1200-1300	2	16	21	174	57	271
1300-1400	4	27	35	246	62	374
1400-1500	20	168	256	1159	180	1784
1500-1600	2	10	15	128	48	204
1600-1700	6	45	69	362	86	568
1700-1800	6	49	77	409	106	647
1800-1900	4	30	49	284	91	459
1900-2000	1	3	6	79	48	137
2000-2100	0	1	2	42	28	73
2100-2200	2	18	28	136	29	213
2200-2300	18	156	240	1041	145	1601
2300-0000	0	0	0	2	1	3

Table 7-13 Gravity Core Scenario Travel Demands - Outbound

DRAFT

Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	21	180	275	1192	163	1831
0600-0700	21	180	278	1217	180	1876
0700-0800	5	35	53	319	101	512
0800-0900	10	84	116	713	184	1107
0900-1000	6	48	61	409	94	618
1000-1100	3	19	22	203	64	310
1100-1200	2	15	19	184	65	286
1200-1300	4	32	37	326	95	495
1300-1400	23	194	284	1407	249	2156
1400-1500	23	193	293	1386	245	2141
1500-1600	3	19	30	312	167	532
1600-1700	8	58	83	550	172	870
1700-1800	10	76	101	671	173	1031
1800-1900	6	38	57	413	149	662
1900-2000	2	5	11	167	106	290
2000-2100	1	2	6	105	70	183
2100-2200	21	175	269	1216	200	1880
2200-2300	21	175	270	1206	196	1867
2300-0000	0	0	0	8	6	15

Table 7-14 Gravity Core Scenario Travel Demands – Two Way Totals

DRAFT

Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	19	47	57	1415	116	1654
0600-0700	3	7	8	205	19	242
0700-0800	4	10	12	307	39	372
0800-0900	8	20	25	645	74	772
0900-1000	5	13	16	403	48	485
1000-1100	2	3	5	127	28	164
1100-1200	1	3	5	122	35	166
1200-1300	3	6	9	225	42	285
1300-1400	21	51	63	1584	164	1883
1400-1500	4	9	13	315	65	405
1500-1600	2	4	10	219	122	356
1600-1700	3	6	11	259	91	369
1700-1800	5	12	16	411	76	521
1800-1900	2	4	7	168	62	242
1900-2000	1	1	3	89	59	153
2000-2100	1	1	2	64	43	110
2100-2200	18	45	56	1405	142	1667
2200-2300	3	6	8	202	48	266
2300-0000	0	0	0	7	5	13

Table 7-15 Gravity BAU Scenario Travel Demands – Inbound

DRAFT

Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	2	5	6	151	12	177
0600-0700	18	45	58	1386	127	1634
0700-0800	1	2	6	128	61	198
0800-0900	5	12	19	449	119	604
0900-1000	3	7	10	238	53	310
1000-1100	2	4	6	153	39	204
1100-1200	1	3	5	122	33	164
1200-1300	3	6	9	233	58	309
1300-1400	5	11	15	378	67	476
1400-1500	20	50	64	1544	153	1832
1500-1600	2	5	7	182	51	247
1600-1700	7	16	23	523	85	654
1700-1800	8	19	27	623	108	785
1800-1900	5	10	16	380	89	501
1900-2000	1	1	3	83	49	137
2000-2100	0	1	2	42	28	73
2100-2200	2	4	7	172	26	213
2200-2300	18	45	57	1365	116	1601
2300-0000	0	0	0	2	1	3

Table 7-16 Gravity BAU Scenario Travel Demands – Outbound

DRAFT

Period	Walk	Cycle	PT	Car Driver	Car Passenger	Total
0000-0100	0	0	0	0	0	0
0100-0200	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0
0500-0600	21	52	63	1567	129	1831
0600-0700	21	52	66	1592	146	1876
0700-0800	5	12	18	435	100	570
0800-0900	13	32	45	1094	193	1376
0900-1000	8	19	26	641	101	795
1000-1100	3	7	11	279	67	368
1100-1200	3	6	10	244	68	330
1200-1300	6	12	18	458	101	595
1300-1400	25	62	79	1962	231	2359
1400-1500	24	59	76	1859	218	2237
1500-1600	4	8	17	401	173	603
1600-1700	10	22	34	782	176	1022
1700-1800	13	30	44	1034	184	1306
1800-1900	7	14	23	547	151	742
1900-2000	2	2	7	172	108	290
2000-2100	1	1	4	106	71	183
2100-2200	21	50	64	1577	168	1880
2200-2300	21	50	65	1567	164	1867
2300-0000	0	0	0	9	6	15

Table 7-17 Gravity BAU Scenario Travel Demands – Two Way Totals

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Summary of 2024 Flow Scenarios

7.8.13 The following traffic flow diagrams for the weekday AM and PM peak hours are provided in **Appendix B**:

- 2024 base – total vehicles – **TF45 a/b** and **TF46 a/b**
- 2024 base – HGVs only – **TF47 a/b** and **TF48 a/b**
- 2024 base with HEP – total vehicles - **TF49 a/b** and **TF50 a/b**
- 2024 base with HEP – HGVs only – **TF51 a/b** and **TF52 a/b**
- 2024 base with Gravity Core Scenario – total vehicles – **TF53 a/b** and **TF54 a/b**
- 2024 base with Gravity Core Scenario – HGVS only – **TF55 a/b** and **TF56 a/b**
- 2024 base with Gravity BAU Scenario – total vehicles – **TF57 a/b** and **TF58 a/b**
- 2024 base with Gravity BAU Scenario – HGVs only - **TF59 a/b** and **TF60 a/b**

Summary of 2032 Flow Scenarios

7.8.1 The following traffic flow diagrams for the weekday AM and PM peak hours are provided in **Appendix B**:

- 2032 base – total vehicles – **TF21 a/b** and **TF22 a/b**.
- 2032 base – HGVs only – **TF23 a/b** and **TF24 a/b**
- 2032 base with HEP – total vehicles – **TF25 a/b** and **TF26 a/b**
- 2032 base with HEP – HGVs only – **TF27 a/b** and **TF28 a/b**
- 2032 base with Gravity Core Scenario – total vehicles – **TF37 a/b** and **TF38 a/b**
- 2032 base with Gravity Core Scenario – HGVS only – **TF39 a/b** and **TF40 a/b**
- 2032 base with Gravity BAU Scenario – total vehicles – **TF41 a/b** and **TF42 a/b**
- 2032 base with Gravity BAU Scenario – HGVs only - **TF43 a/b** and **TF44 a/b**

7.9 HEP & Gravity Travel Demands Comparison

7.9.1 **Tables 7-18** to **7-20** have been prepared to provide a comparison of the peak hour and daily two-way travel demands generated by HEP and Gravity.

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Time Period	HEP	Gravity Core	Gravity BAU
AM Peak	1,458	1,107	1,376
PM Peak	1,329	1,031	1,306
Daily	12,236	18,664	20,247

Table 7-18 HEP and Gravity Travel Demand Comparison (all non-HGV movements)

Time Period	HEP	Gravity Core	Gravity BAU
AM Peak	142	38	38
PM Peak	69	38	38
Daily	926	894	894

Table 7-19 HEP and Gravity Travel Demand Comparison (HGV movements)

Time Period	HEP	Gravity Core	Gravity BAU
AM Peak	1,600	1,145	1,414
PM Peak	1,398	1,068	1,344
Daily	13,162	19,558	21,141

Table 7-20 HEP and Gravity Total Travel Demand Comparison (All vehicle movements)

7.9.2 **Tables 7-21** to **7-23** have been prepared to provide a comparison of the peak hour and daily two-way car driver demands generated by HEP and Gravity.

Time Period	HEP	Gravity Core	Gravity BAU
AM Peak	1,247	713	1,094
PM Peak	1,134	671	1,034
Daily	10,461	12,004	16,325

Table 7-21 HEP and Gravity Travel Demand Comparison (car driver movements)

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Time Period	HEP	Gravity Core	Gravity BAU
AM Peak	142	38	38
PM Peak	69	38	38
Daily	926	894	894

Table 7-22 HEP and Gravity Travel Demand Comparison (HGV movements)

Time Period	HEP	Gravity Core	Gravity BAU
AM Peak	1,389	751	1,132
PM Peak	1,203	709	1,072
Daily	11,387	12,898	17,219

Table 7-23 HEP and Gravity Total Travel Demand Comparison (HGVs + car driver)

7.9.3 The analysis set out in the tables above demonstrate the following:

- The travel demand in the Gravity Core Scenario is significantly lower than the Gravity BAU scenario in all time periods.
- Both the Gravity Core and Gravity BAU scenarios generate travel demands lower than the HEP Extant Consent scenario during the weekday peak hours.
- The daily travel demand for both Gravity Core and Gravity BAU scenarios are greater than the HEP Extant Consent scenario.

7.10 Summary

7.10.1 This chapter described the appraisal methodology that has been developed to assess the Gravity development impact on the road network surrounding the Site in the traditional weekday AM and PM peak hours. The scope of the assessment undertaken reflects the peak hour traffic generation and the comparative impacts of the HEP Extant Consent as set out previously.

7.10.2 The impact assessment results were set out for two Gravity scenarios – the Core and BAU scenarios – with the former being the primary focus and the latter specifically requested by SCC / NH. The Gravity impacts have also been compared against the impacts associated with the HEP Extant Consent. The Gravity impacts demonstrated do not include any potential traffic generation benefit that could be realised if the Gravity rail link is reinstated for passenger and freight use.

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7.10.3 The chapter has demonstrated the following:

- The travel demand in the Gravity Core Scenario is significantly lower than the BAU scenario in all time periods.
- Both the Gravity Core and BAU scenarios generate travel demands lower than the HEP Extant Consent scenario during the weekday peak hours.
- The daily travel demand for both Gravity Core and BAU scenarios are greater than the HEP Extant Consent scenario.

7.10.4 To carry out this assessment, a 2032 future base year has been created through the allowance of projected background traffic growth, and the addition of committed development and Hinkley Point C trip generations.

7.10.5 The assessment does not assume any peak hour spreading during congested peaks, so considers a robust impact case in the peaks.

7.10.6 The assessment methodology adopted is considered robust and appropriate given the current stage of the LDO process. It has allowed us to identify the potential need for future highway mitigation which is captured in Chapter 9, although the need for mitigation should be considered in the context of the comparable impact between the Gravity Core Scenario and the HEP Extant Consent scenario.

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8 Development Impact

8.1 Introduction

8.1.1 This chapter sets out the predicted traffic impacts of the Proposed Development upon the operation of all junctions forming the TA study area as defined previously within Chapter 7.

8.1.2 The results presented can be considered as robust as they do not include the potential for reassignment or peak spreading of traffic into the shoulders of the morning and evening peak periods. The results also do not include any adjustment to future baseline flows to reflect the potential modal shift that could be achieved due to the implementation of the Sedgemoor Transport Strategy as set out in the TIS 2050 vision document.

8.1.3 This chapter refers to various figures, drawings and appendices. As stated previously, all such information is included in a separate Stantec TA Appendices Report.

8.2 Junction Capacity Assessment Methodology

8.2.1 The list below confirms which software package was used to assess the operation of each junction under consideration.

- Gravity Site Access / Woolavington Road roundabout (Junctions 10 ARCADY module – standalone model – with lane simulation applied)
- A39 Puriton Hill / Gravity Link Road roundabout (Junctions 10 ARCADY module – standalone model – with lane simulation applied)
- M5 Junction 23 (LINSIG 3 – standalone model)
- A38 Dunball roundabout (LINSIG 3 – standalone model)

8.2.2 The assessment of priority-controlled junctions has been undertaken using the ARCADY module of Junctions 10, which is industry standard traffic modelling software. For priority junctions, it is generally considered that a junction is operating within capacity where the Ratio of Flow to Capacity (RFC) is less than or equal to 85%. A junction is said to be operating at a level approaching or at capacity between 86%-100% RFC. All RFC values above 100% would typically mean that a junction (or specific approach to a junction) is operating above capacity but the significance of this would depend on circumstances.

8.2.3 Lane Simulation Mode has been used for the ARCADY modelling to balance flows between approach lanes. As stated in the Junctions 10 User Guide, the Lane Simulation Mode:

- *"uses a simulation technique which is based on the simple modelling of individual vehicles." "Each vehicle is assigned a lane according to the vehicle's desired movement (based on the entered turning proportions) and the allowed movements on each lane. If there is a choice of more than one lane then the lane with the shortest queue at that moment is selected" and,*
- *"The length of each lane has been defined based on the number of PCUs that can be stored in each lane. If such a lane is filled with queuing vehicles, then new vehicles cannot enter the lane and instead will queue in upstream lanes." "At any point on an approach where the number of lanes change, each vehicle again chooses a suitable lane, using the same rules. Vehicles do not change lane at any other time."*

8.2.4 The Lane Simulation Mode does not provide an RFC output and instead provides a Level of Service (LOS) value. LOS is a measure of the average delay per arriving vehicle at the junction based on queuing delay. LOS ranges from Level A, 'free flow', through to Level F, 'forced or breakdown flow'.

8.2.5 The assessment of traffic signal-controlled junctions has been undertaken using LINSIG 3 which is also an industry standard traffic modelling software package. For signalised junctions, a Degree of Saturation (DoS - %) value of less than 90% typically demonstrates that a junction arm or turning movement is operating 'within capacity' and is therefore unlikely to experience oversaturated queuing.

8.2.6 To assess the operation of the A38 Dunball roundabout and M5 Junction 23 roundabout junctions, standalone LINSIG models have been produced. The models of the junctions have been developed individually due to the significant distance between the junctions (more than 500m) and the approach also allows greater flexibility in cycle time and signalling strategy.

8.2.7 The models have been optimised using JCT recommended manual signal timing assignment processes. This has been done robustly, ensuring that the reported internal queues on signalised circulatory arms do not exceed 75% of the available internal stacking space to ensure that the variability in the modelled queue can be accommodated.

8.2.8 Further to the information set out in Chapter 7, the following traffic scenarios are assessed in this chapter:

- 2018 base
- 2032 base including HEP Extant Consent
- 2032 base excluding HEP Extant Consent, but including Gravity Core Scenario
- 2032 base excluding HEP Extant Consent, but including Gravity BAU Scenario

8.2.9 The traffic scenarios assessed are representative of the weekday peak hours (i.e., 8-9am and 5-6pm).

8.3 Site Access / Woolavington Road Roundabout Capacity Results

8.3.1 All modelling reports relating to the summary results for this junction, as set out below, are provided in **Appendix L**.

8.3.2 The 2018 base capacity assessment results for this junction are set out in **Table 8-1**.

Link	Woolavington Road / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MMQ	Delay (Secs)
Woolavington Road (E)	A	0.2	5.04	A	0.2	4.81
Gravity Link Road (S)	A	0.0	4.07	A	0.1	4.51
Woolavington Road (W)	A	0.2	5.15	A	0.3	5.58
Gravity Link Road (N)	A	0.0	0.00	A	0.0	0.00

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-1: Site Access / Woolavington Road roundabout capacity results – 2018 base

8.3.3 The 2032 base including HEP Extant Consent capacity assessment results for this junction are set out in **Table 8-2**.

Link	Woolavington Road / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MMQ	Delay (Secs)
Woolavington Road (E)	A	0.7	6.72	A	0.3	6.66
Gravity Link Road (S)	F	27.3	113.65	A	0.6	7.37
Woolavington Road (W)	B	0.7	10.47	A	0.5	7.36
Gravity Link Road (N)	A	1.5	9.10	C	6.0	20.37

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-2: Site Access / Woolavington Road roundabout capacity results – 2032 base with HEP Extant Consent

8.3.4 The 2032 base including Gravity Core Scenario capacity assessment results for this junction are set out in **Table 8-3**.

Link	Woolavington Road / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MMQ	Delay (Secs)
Woolavington Road (E)	A	0.4	5.70	A	0.3	5.46
Gravity Link Road (S)	A	1.0	8.07	A	0.6	6.14
Woolavington Road (W)	A	0.4	7.08	A	0.5	6.97
Gravity Link Road (N)	A	0.8	5.92	A	1.1	7.03

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-3: Site Access / Woolavington Road roundabout capacity results – 2032 base with Gravity Core Scenario

8.3.5 The 2032 base including Gravity BAU Scenario capacity assessment results for this junction are set out in **Table 8-4**.

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Link	Woolavington Road / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MMQ	Delay (Secs)
Woolavington Road (E)	A	0.6	6.22	A	0.3	5.99
Gravity Link Road (S)	B	2.1	13.37	A	0.8	7.62
Woolavington Road (W)	A	0.5	7.96	A	0.6	7.91
Gravity Link Road (N)	A	1.2	7.48	B	1.9	10.14

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-4: Site Access / Woolavington Road roundabout capacity results – 2032 base with Gravity BAU Scenario

Summary

8.3.6 The junction is forecast to operate without constraint and with negligible queuing in both time periods for either of the Gravity development scenarios.

8.4 A39 Puriton Hill / Gravity Link Road Roundabout Capacity Results

8.4.1 All modelling reports relating to the summary results for this junction, as set out below, are provided in **Appendix M**.

8.4.2 The 2018 base capacity assessment results for this junction are set out in **Table 8-5**.

Link	A39 Puriton Hill / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MMQ	Delay (Secs)
Gravity Link Road	A	0.4	5.70	A	0.1	5.24
A39 Puriton Hill (E)	A	2.2	9.53	A	1.7	7.34
A39 Puriton Hill (W)	C	3.5	17.61	D	7.4	28.35
Puriton Hill	C	1.3	16.29	B	0.4	10.90

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-5: A39 Puriton Hill / Gravity Link Road roundabout capacity results – 2018 base year

8.4.3 The 2032 base with HEP Extant Consent capacity assessment results for this junction are set out in **Table 8-6**.

Link	A39 Puriton Hill / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MMQ	Delay (Secs)
Gravity Link Road	C	4.2	24.25	F	23.3	93.33
A39 Puriton Hill (E)	E	16.0	48.23	C	6.2	22.93
A39 Puriton Hill (W)	C	9.4	22.72	F	21.4	57.29
Puriton Hill	F	15.2	183.41	C	0.7	18.33

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-6: A39 Puriton Hill / Gravity Link Road roundabout capacity results – 2032 base with HEP Extant Consent

8.4.4 The 2032 base with Gravity Core Scenario capacity assessment results for this junction are set out in **Table 8-7**.

Link	A39 Puriton Hill / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MMQ	Delay (Secs)
Gravity Link Road	B	1.8	11.69	B	1.6	11.74
A39 Puriton Hill (E)	C	7.2	24.95	B	3.8	13.35
A39 Puriton Hill (W)	C	5.2	15.35	F	18.4	52.82
Puriton Hill	E	3.9	44.87	C	0.7	17.05

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-7: A39 Puriton Hill / Gravity Link Road roundabout capacity results – 2032 base with Gravity Core Scenario

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8.4.5 The 2032 base with Gravity BAU Scenario capacity assessment results for this junction are set out in **Table 8-8**.

Link	A39 Puriton Hill / Gravity Link Road					
	AM Peak			PM Peak		
	LOS	MMQ	Delay (Secs)	LOS	MM3.9Q	Delay (Secs)
Gravity Link Road	C	2.5	16.84	C	4.1	23.47
A39 Puriton Hill (E)	E	13.4	41.65	C	4.4	17.05
A39 Puriton Hill (W)	C	5.5	16.71	F	24.4	56.71
Puriton Hill	F	6.3	74.55	C	0.8	18.74

LOS = Level of Service, MMQ = Maximum Mean Queue

Table 8-8: A39 Puriton Hill / Gravity Link Road roundabout capacity results – 2032 base with Gravity BAU Scenario

Summary

8.4.6 The junction is forecast to operate best under the Gravity Core Scenario, with a MMQ of 18 vehicles on the A39 West approach in the PM peak being the only minor constraint. This level of queueing is isolated to just the PM peak hour and would not be expected to be continuous at the same level throughout the whole hour, or block back to affect the operation and safety of M5 Junction 23.

8.5 M5 Junction 23 Capacity Results – Existing Junction Layout

8.5.1 All modelling reports relating to the summary results for this junction, as set out below, are provided in **Appendix N**.

8.5.2 The 2018 base capacity assessment results for this junction based on the existing layout are set out in **Table 8-9**.

2018 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	54.0%	6.8	13.5	66.6%	9.5	14.5
M5 North	71.4%	10.6	15.8	67.6%	8.3	21.1
A39 East	92.1%	12.9	55.0	86.0%	8.5	50.8
M5 South	86.2%	10.5	41.2	58.3%	5.6	24.3

Table 8-9: M5 Junction 23 existing layout junction capacity assessment results – 2018 base year

8.5.3 The 2032 base with HEP extant consent capacity assessment results for this junction based on the existing layout are set out in **Table 8-10**.

2032 HEP	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	163.6%	163.4	703.2	107.1%	55.1	175.5
M5 North	98.7%	31.6	69.4	96.5%	24.6	62.7
A39 East	333.9%	295.3	1404.8	169.7%	165.5	843.4
M5 South	96.0%	19.7	71.9	93.4%	17.0	62.3

Table 8-10: M5 Junction 23 existing layout junction capacity assessment results – 2032 with HEP extant consent

8.5.4 The 2032 base with Gravity Core Scenario capacity assessment results for this junction based on the existing layout are set out in **Table 8-11**.

2032 Core	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	88.0%	16.4	41.8	97.5%	28.6	63.6
M5 North	88.0%	19.6	33.0	96.9%	24.5	66.1
A39 East	246.4%	230.1	1199.7	144.4%	105.8	636.9
M5 South	96.0%	19.7	71.9	91.3%	15.2	57.5

Table 8-11: M5 Junction 23 existing layout junction capacity assessment results – 2032 with Gravity Core Scenario

8.5.5 The 2032 base with Gravity BAU Scenario capacity assessment results for this junction based on the existing layout are set out in **Table 8-12**.

2032 BAU	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	91.0%	18.3	47.2	98.9%	31.4	72.8
M5 North	96.0%	26.6	53.5	98.6%	28.2	76.0
A39 East	251.3%	260.4	1239.2	156.5%	133.5	737.5
M5 South	96.0%	19.7	71.9	93.2%	16.9	61.7

Table 8-12: M5 Junction 23 existing layout junction capacity assessment results – 2032 with Gravity BAU Scenario

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Summary

8.5.6 The 2032 forecast year assessments undertaken have identified a capacity constraint at M5 Junction 23 mainly on the A39 East approach, although the greatest constraint shown under the HEP Extant Consent scenario suggests both of the A39 approaches operating over capacity and with significant queueing. The junction is shown to perform better in the Gravity Core Scenario, with the congestion only shown to occur on the A39 East approach in both peak hours.

8.5.7 In light of this, an additional 2032 assessment without any development at the Site has been undertaken (i.e. no HEP or Gravity demands included) and the results are shown in **Table 8-13** below.

2032 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	86.8%	15.4	41.3	88.2%	16.2	28.9
M5 North	87.8%	19.8	31.7	83.2%	12.2	28.5
A39 East	122.1%	65.7	394.2	89.2%	10.1	54.5
M5 South	96.0%	19.7	71.9	85.5%	9.5	43.5

Table 8-13: M5 Junction 23 existing layout junction capacity assessment results – 2032 base scenario

8.5.8 The results demonstrate that there is still a capacity constraint on the A39 East approach, however the congestion is limited to the AM peak hour only and is less significant than previously shown.

8.5.9 A further 2024 interim assessment (see **Table 8-14**) has been undertaken (on the basis that 2024 is considered to be the earliest potential year of opening for Gravity) prior to investigating development impacts further.

2024 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	89.4%	15.5	49.2	80.9%	12.8	22.7
M5 North	71.2%	12.3	23.0	73.5%	9.6	23.1
A39 East	91.4%	14.9	59.5	81.5%	7.8	42.3
M5 South	96.2%	18.2	78.8	75.3%	7.4	33.7

Table 8-14: M5 Junction 23 existing layout junction capacity assessment results – 2024 future base

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8.5.10 The 2024 base year test above demonstrates that the existing M5 Junction 23 is forecast to operate close to but within capacity in both the AM and PM peak hours. In light of these results, it could be considered that the most appropriate time to undertake more detailed analysis of this junction would be at the LDO Compliance Application stage when there would be greater certainty over the end occupier(s) and the scale / form of development coming forward at Gravity.

8.5.11 Notwithstanding this, and with reference to the requirements of the DfT Circular 02/13, potential mitigation has been explored at M5 Junction 23 based on the 2024 interim assessment year.

8.6 M5 Junction 23 Capacity Results – Potential Improved Junction Layout

8.6.1 A potential mitigation scheme has been explored at M5 Junction 23 in light of the capacity analysis findings set out in the previous section. Drawing 332310102-5505-SK06 included in **Appendix C** has been identified as a potential mitigation scheme and includes the following:

- Widening of southbound off slip approach to 3 lanes at stop line and new 40m flare
- Northeast part of the roundabout circulatory widened to 3 lanes
- A39 eastbound exit widened to 2 lanes
- Southeast part of the roundabout circulatory widened to 3 lanes

8.6.2 All modelling reports relating to the summary results for this mitigation scheme, as set out below, are provided in **Appendix O**.

8.6.3 A 2024 future base assessment (**Table 8-15**) has been undertaken first to provide a direct comparison with the 2024 future base (existing junction layout) results above.

2024 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	89.4%	15.5	49.2	80.9%	12.8	22.7
M5 North	70.5%	7.6	18.8	74.1%	6.9	23.2
A39 East	87.5%	13.4	49.3	81.5%	7.8	42.3
M5 South	88.2%	14.0	49.4	75.3%	7.4	34.1

Table 8-15: M5 Junction 23 potential improved layout junction capacity assessment results – 2024 future base

8.6.4 The results demonstrate that the potential mitigation scheme delivers clear benefit to the operational performance of the junction in both time periods. All approaches are shown to operate within capacity and with improved balancing of flows across the junction.

8.6.5 Further assessments have been undertaken with the addition of Gravity development traffic, and the results are set out below.

8.6.6 The 2024 base with Gravity Core Scenario capacity assessment results for this junction based on the potential improved layout are set out in **Table 8-16**.

2024 Core	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	90.5%	16.5	50.0	94.8%	23.6	53.3
M5 North	85.8%	14.3	26.0	79.6%	9.9	26.3
A39 East	90.2%	16.8	47.3	94.3%	17.4	67.3
M5 South	92.0%	15.4	59.8	89.7%	13.5	57.1

Table 8-16: M5 Junction 23 potential improved layout junction capacity assessment results – 2024 with Gravity Core Scenario

8.6.7 The results demonstrate that the junction would still be expected to operate within capacity under the Gravity Core Scenario.

8.6.8 The 2024 base with Gravity BAU Scenario capacity assessment results for this junction based on the potential improved layout are set out in **Table 8-17**.

2024 BAU	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A39 West	90.5%	17.0	48.7	96.3%	25.3	59.2
M5 North	88.9%	16.9	28.3	87.9%	13.5	34.9
A39 East	89.1%	17.2	42.9	98.5%	22.5	88.5
M5 South	96.2%	18.2	78.8	87.9%	13.5	50.2

Table 8-17: M5 Junction 23 potential improved layout junction capacity assessment results – 2024 with Gravity BAU Scenario

8.6.9 The results demonstrate that the junction would also be expected to operate within capacity under the Gravity BAU Scenario.

Summary

8.6.10 The 2032 forecast year junction assessments undertaken indicated potential capacity constraints at M5 Junction 23 under its existing layout, even without the HEP or Gravity development included.

8.6.11 The Site already benefits from the HEP Extant Consent, and it has been demonstrated that the Gravity Core and BAU scenario travel demands are lower than the HEP scenario in the peak hours.

8.6.12 A 2024 interim assessment has been undertaken on the basis this is considered to be the earliest possible opening year for Gravity and it also aligns with the requirements of the DfT Circular 02/2013. This has demonstrated that the existing junction would operate within capacity in the 2024 future base year without any development at the Site included.

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8.6.13 Due to the range of future uncertainties and flexible approach of the LDO, It is therefore considered that the most appropriate time to undertake more detailed analysis of this junction would be at the LDO Compliance Application stage when there would be greater certainty over the end occupier(s), the scale / form of development coming forward at Gravity, and the specific package of sustainable transport measures that will be implemented by that time. Notwithstanding this, it is noted that SCC / NH may wish to see if a mitigation scheme can be provided and capable of mitigating the Gravity impact.

8.6.14 A potential mitigation scheme has been explored at M5 Junction 23 in light of the capacity analysis findings set out in the previous section. Drawing 332310102-5505-SK06 included in **Appendix C** has been identified as a potential mitigation scheme.

8.6.15 The associated modelling demonstrated that the junction under the potential mitigation scheme would be expected to operate within capacity under the Gravity Core and BAU Scenarios.

8.6.16 It should also be noted that the Gravity development under the Core Scenario is forecast to have a significantly lower peak period vehicle trip generation and corresponding impact than the HEP Extant Consent, which could be built out without any further requirement for improvement at Junction 23.

8.6.17 Refinements could be made to the assessments undertaken in the future, and this may potentially include re-assessment of the scheme using the NH Paramics model if a suitable forecast year model exists at that time. If this is deemed to of value, the appropriate time to do this would be as part of any first LDO Compliance Application.

8.6.18 Noting the potential requirement for either a development led specific Junction 23 improvement or supported delivery of a broader network proposal, the potential need for site specific mitigation is recognised and incorporated into the proposed Mitigation Measures outlined in Chapter 9.

8.7 A38 Dunball Roundabout Capacity Results

8.7.1 All modelling reports relating to the summary results for this junction, as set out below, are provided in **Appendix P**.

8.7.2 The 2032 base with HEP extant consent capacity assessment results for this junction based on the planned improved layout are set out in **Table 8-18**.

2032 HEP	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A38 North	38.7%	0.5	1.5	34.9%	0.3	1.7
A39 East	88.4%	13.3	21.6	74.0%	8.2	17.2
A38 South	75.5%	8.5	22.0	79.3%	10.3	20.8
Park and Ride	31.3%	1.5	26.3	68.9%	4.1	36.3

Table 8-18: A38 Dunball roundabout planned improved layout junction capacity assessment results – 2032 base with HEP extant consent

8.7.3 The 2032 base with the Gravity Core Scenario capacity assessment results for this junction based on the planned improved layout are set out in **Table 8-19**.

2032 Core	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A38 North	38.9%	0.5	1.5	33.5%	0.2	1.5
A39 East	88.0%	13.1	21.2	67.1%	7.2	15.0
A38 South	67.6%	7.3	18.4	82.5%	11.1	23.9
Park and Ride	31.3%	1.5	26.3	68.9%	4.1	36.6

Table 8-19: A38 Dunball roundabout planned improved layout junction capacity assessment results – 2032 base with Gravity Core Scenario

8.7.4 The 2032 base with the Gravity BAU Scenario capacity assessment results for this junction based on the planned improved layout are set out in **Table 8-20**.

2032 BAU	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	Queue (PCU)	Delay (s)	DoS	Queue (PCU)	Delay (s)
A38 North	38.5%	0.5	1.5	33.7%	0.2	1.6
A39 East	89.3%	13.9	22.2	68.9%	7.4	15.3
A38 South	69.6%	7.6	18.9	68.5%	8.4	13.7
Park and Ride	31.3%	1.5	26.3	68.9%	4.1	36.6

Table 8-20: A38 Dunball roundabout planned improved layout junction capacity assessment results – 2032 base with Gravity BAU Scenario

Summary

8.7.5 The A38 Dunball Roundabout is forecast to operate within capacity in all scenarios and time periods, under the planned improvement scheme layout.

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9 Proposed Package of Mitigation Measures

9.1 Introduction

9.1.1 A transport strategy has been prepared, as outlined in Sections 5 and 6 of this report, to support access and movement to, and movement within, the Gravity development seeking to maximise opportunities for travel by sustainable modes whilst minimising residual highway impacts.

9.1.2 As set out earlier within this report, this approach is central to the overarching development vision at Gravity for clean and sustainable growth and is aligned with national and local transport policy objectives.

9.1.3 This section of the report provides a summary of the supporting transport mitigation measures identified to support the Gravity development proposal as defined by the 'Core Scenario' and outlines the proposed approach as to how these measures will be secured through the LDO process.

9.2 Outline Package of Mitigation Measures

9.2.1 The scenario tool, described in Section 5 of this report, has been used to identify a 'Core Scenario' for testing which is based around a comprehensive package of proposed supporting transport measures with the objective of achieving the desired outcome of the Core Scenario thereby mitigating the potential impact of the development.

9.2.2 The 'Core Scenario' (and BAU scenario) is based upon a single set of development land use assumptions outlined earlier in this report deemed to be at the likely upper limit of land uses potentially deliverable through the LDO.

9.2.3 From this single set of land use assumptions and through consideration of a range of transport intervention scenarios, an outline package of transport mitigation measures has been identified at Section 6 of this report to support the Gravity development proposals as defined by the 'Core Scenario'.

9.2.4 These measures are summarised in **Table 9-1** and range from on-site proposals, including a mix of land uses proposed to minimise travel, prioritisation of movement within the site by sustainable modes and managing parking, through to off-site proposals including improved bus services to the site and off-site pedestrian/cycle and highway infrastructure improvements.

ID	Measure
1	Mix of Land Uses (1): Advanced Manufacturing Shift Pattern: shift change avoiding AM and PM peak hours, flexible working patters elsewhere
2	Mix of Land Uses (2): Access to supporting (e.g. retail, leisure, health) land uses available for employees and/or on-site residents, as well as the proposed new 37 Club retained for use/access in line with existing arrangements
3	Mix of Land Uses (3): Residential development to be subject to appropriately worded requirements linking scale, typology and occupation to employment requirements
4	On-site design and infrastructure: Delivery of on-site proposals in accordance with the supporting Design Guide and LDO Parameter Plans including on-site pedestrian and cycle links and facilities, Micro Mobility connections, mobility hubs and vehicle share schemes. (NB rail proposals remain subject to separate consideration / occupier

	demand and are not assumed to be delivered as part of the 'core scenario' outlined within this report)
5	Implementation of a Car Parking Management Strategy to determine the amount of parking provided on site, type (e.g. car share, disabled access, EV charging and visitor provision) and location of parking, access to parking and any potential parking charges for use of parking on site
6	Implementation of a Framework Travel Plan (submitted under separate cover) with monitoring regime to achieve preliminary modal shift targets and supporting mechanisms for securing additional sustainable transport measures, as required
7	Improved bus service(s) to the site incorporating enhanced main A38 corridor bus services and/or dedicated Demand responsive Transit (DRT) minibus / e-bus services for employees to align with shift patterns
8	Support delivery of SCC/SDC promoted off-site pedestrian/cycle improvements deliverable within SCC, NH and/or SDC land improving access to/from the Gravity site to Bridgwater Town Centre and/or Bridgwater Train Station
9	Support delivery of SCC/SDC promoted off-site highway capacity and/or safety improvements deliverable within SCC, NH and/or SDC land improving access to/from the Gravity site and commensurate with the scale of peak period development impacts.

Table 9-1 Outline package of mitigation measures

9.3 Securing Mitigation Measures

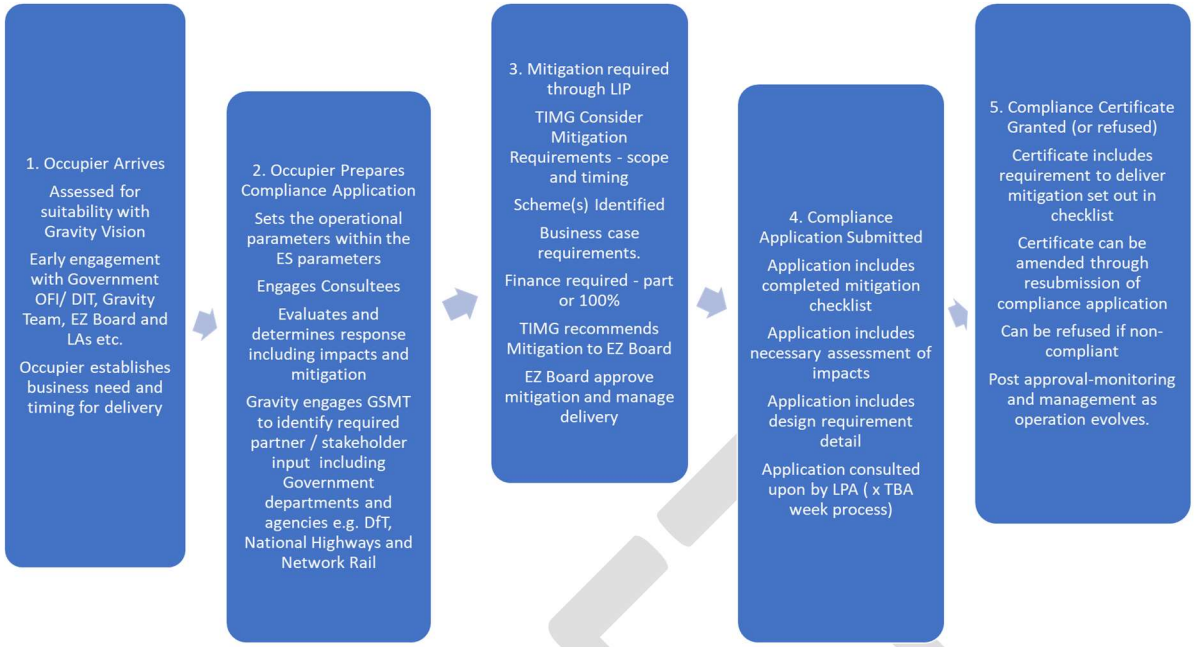
9.3.1 There remains significant uncertainty around the future transport impacts of the Gravity scheme given the very nature of an LDO application with broad development parameters outlined at this stage rather than occupier led fixed requirements. For example, it is not currently known who the final occupiers of the site will be, what the final scale and type of development will be or whether it will be delivered on a phased basis.

9.3.2 The measures outlined in **Table 9-1** are therefore considered to be required to support/mitigate the Gravity development proposals as defined by the single set of land use assumptions used within this assessment (fully occupied site based on maximum land use areas permissible). Accordingly, they represent an outline package of measures that are likely to be required for a development of this scale/type but remain subject to review following confirmation of the development proposals required by the end occupier and managed through future LDO Compliance Applications.

9.3.3 It is anticipated that the measures outlined in **Table 9-1** will be incorporated into a broader LDO Mitigation Checklist against which any future LDO Compliance Application will be assessed with supporting evidence required to demonstrate which measures are required, which measures are not required and how they will be delivered.

9.3.4 All LDO Compliance Applications will therefore need to demonstrate what specific mitigation is required with reference to each of the nine numbered items in **Table 9-1,** with the details and scale of any mitigation linked to the type/scale of the development proposed within the respective LDO Compliance Application demonstrating how the target mode share and overall peak traffic movement numbers will be met.

9.3.5 At the time of writing, it is anticipated that the LDO Implementation and Compliance Processes is likely to require the following broad stages in respect to defining the appropriate transport mitigation for any given LDO Compliance Application:



9.3.6 With reference to the process outlined above, at Stage 1 and upon confirmation of an end occupier(s) interest in the development proposal and land use details will be more certain including better defined site-specific workforce details (e.g. workforce catchment areas, shift patterns etc etc) against which the respective development travel demands can be re-assessed.

9.3.7 There will then be a requirement at Stage 2 for the preparation of an LDO Compliance Application during which it is anticipated that the following activities will be required:

- Confirmation of the development proposals including confirmed scale of land use and employee numbers / workforce details (including any proposed working hours/shift patterns and employee catchment areas);
- Engagement with key stakeholders including NH, NR and SCC;
- Scoping of assessments to re-assess potential development impacts including re-assessment using the assessment approach incorporated within this report or alternative assessment approach as agreed with key stakeholders including NH and SCC;
- Identification of a revised set of LDO Compliance Application specific travel demands, target mode shares and supporting mitigation measures.

9.4 Monitor and Manage

9.4.1 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 Gravity is on track to deliver against the targets. This will be achieved through the preparation and implementation of a broader site monitor and manage plan.

9.4.1 The measures detailed in **Table 9-1** are proposed to limit travel demands arising from the development proposals and seek to achieve preliminary modal shift targets as identified within the FTP thereby limiting network traffic impacts in the traditional AM and PM peak periods to levels below the HEP Extant Consent as detailed in **Table 1-1** of this TA.

9.4.2 As part of future LDO Compliance Applications, it is anticipated that any specific mitigation measures required to support delivery would be linked to an ongoing Monitor and Manage arrangement to track whether the actual operational development travel demands are in line with the predicted demands.

9.4.3 At this stage it is anticipated that the primary monitoring mechanism in respect of mitigation measures (ID 1 to 8 within Table 9-1) will be to monitor off-site multi-modal trips to assess actual trip generation against the identified preliminary mode share targets set out. The monitoring methodology and frequency for reporting would be set out as part of any future LDO Compliance Application, and will need to allow for an agreed time period by when the targets should be expected to be met from first occupation.

9.4.4 In addition to this, any requirement for site-specific highway capacity or safety improvements (ID 9 within Table 9-1) may be triggered if the actual car driver mode share exceeds the preliminary mode share target for off-site multi-modal trips and if peak period highway impacts are predicted to exceed the peak period vehicle trip generation set out. The monitoring methodology and frequency for reporting would be set out as part of a future LDO Compliance Application, and will need to allow for an agreed time period from when the agreed targets should be expected to be met from first occupation.

9.4.5 The delivery of this outline package of mitigation remains subject to ongoing discussions with the highway and planning authorities.

9.5 Locality Investment Plan

9.5.1 Should there be a requirement for further mitigation there will also be the opportunity to seek delivery of additional transport improvements including those set out within the LDO Locality Investment Plan, draft copy attached at **Appendix O**.

9.5.2 The draft LDO Locality Investment Plan sets out high level potential schemes which may be required to realise the full delivery of the EZ and to mitigate the potential impacts of the LDO including aspects forming part of the TA / FTP.

9.5.3 An overarching EZ Board will be formed, along with two sub groups, one of which will be a Transport and Infrastructure Management Group (TIMG).

9.5.4 The TIMG will be established to lead and co-ordinate transport and infrastructure related matters in respect of Gravity mobilisation and implementation. In particular in respect of infrastructure delivery, and the monitoring and management of the transport effects of the project. This will be achieved through oversight of the FTP, individual occupier travel plans, and related construction traffic management plans.

9.5.5 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 measures.

9.5.6 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.

9.5.7 Arrangements for implementation of the measures referred to here will be found variously in the LDO Design Guide, the LDO itself and any s106 agreement connected to the LDO.

9.5.8 In respect of the early need for infrastructure delivery ahead of development, it is possible that through the LDO Locality Investment Plan, the market may choose a more incremental solution, with challenging infrastructure and timing needs, and this may require borrowing in advance (pump priming), to be refunded through future business rates income.

9.5.9 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 locality investment plan and retained business rates from the EZ. The challenge will be for the local authority to commission and deliver schemes in a timely way to manage and reduce impacts.

9.5.10 As local government review proceeds and the planned 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.

9.5.11 A number of transport schemes are included in the LDO Locality Investment Plan including:

- On-site schemes, including:
  - Establishing a revolving infrastructure fund to accelerate site preparation, and to be refunded by business rates to expedite commissioning and delivery.
  - On site strategic transport priorities: estate roads and mobility network linked to the transport assessment
  - Rail restoration and station
  - Multi-storey car parking with integral EV Charging
  - Any other initiative included within the FTP not defined elsewhere
  - Smart mobility hubs
- Off-site schemes, including:
  - High frequency bus services to Gravity (linked to transport assessment)
  - M5 J23 Strategic improvement (linked to transport assessment)
  - Active travel improvements across Bridgwater: Bridgwater to Gravity walking and cycling links (including A38 and A39 corridors) linked to transport assessment
  - Other potential transport improvements on the Major Road Network / Local Road Network, including Dunball Rbt and the A38 / A39 corridors
  - Park and ride facilities
  - Smart Mobility Hubs within Bridgwater (linking to Gravity)
  - Burnham on Sea / Highbridge to Gravity walking and cycling improvements
- Innovation, Skills and Training, including:
  - Innovation / SME space related to supply chain development

- Drone / EVTOL logistics - trials / business case development

- Minor Improvement Projects, including:
  - Walking and cycling enhancements within the villages
  - Enhanced village signage / wayfinding
- Locality Projects, including:
  - EV Infrastructure in Bridgwater
  - Bridgwater Rail Station Accessibility Enhancements
  - Digital investment – superfast broadband, 5G
  - Mass transport connectivity to Bristol Airport from Gravity and Bridgwater
  - Admin and Governance, including officer time including statutory consultations, Transport and Infrastructure Manager

9.6 Summary

9.6.1 This chapter of the report has provided a summary of the supporting transport mitigation measures identified to support the Gravity development proposal as defined by the 'Core Scenario' and outlines the proposed approach as to how these measures will be secured through the LDO process.

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10 Summary and Conclusions

10.1 Summary

10.1.1 This Transport Assessment (TA) has been prepared by 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 . The LDO will grant a simplified, flexible planning permission capable of meeting market requirements for the Gravity Smart Campus and Community ("Proposed Development").

10.1.2 This TA has been produced in line with Planning Practice Guidance on TAs and, as a result, establishes the requirements of the Proposed Development in terms sustainability and accessibility by walking, cycling, Micro Mobility and public transport, as well as an assessment of potential residual vehicular traffic demand impacts. The assessment undertaken has sought to determine whether the surrounding transport network is suitable to accommodate the likely overall travel demands of the Proposed Development.

10.1.3 The 261.54-hectare site is within ownership of This is Gravity Ltd and is within the administrative boundary of SDC, and the full site is a Government approved Enterprise Zone EZ, 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 in 2017 for Huntspill Energy Park (HEP – reference number 42/13/00010 - the 'Extant Consent') has enabled the construction of a new link road (Gravity Link Road) as part of that consent, to be completed in October/November 2021.

10.1.4 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.

10.1.5 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.

10.1.6 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 for each specific building. The implementation process is replaced by a fast-track compliance process when individual proposals can be authorised within the LDO framework.

10.1.7 LDOs create certainty for prospective occupiers and save time for those involved in the planning process, whilst ensuring that public interests such as in efficient 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 EZ to support delivery and locality transformation. The LDO responds to that commitment.

10.1.8 This site also benefits from an Extant Consent for redevelopment (Huntspill Energy Park – HEP). The uses approved under this Extant Consent are set out below:

- 8.78 ha of B1 (max 32,150 sqm)
- 14.84 ha of B2 (max 43,600 sqm)
- 30.45 ha of B2 (max 101,310 sqm)
- Safeguarded: 38.74 ha of energy generation uses, 11.22 ha of leisure / community uses and the rail head

10.1.9 The Gravity description of development has been specified 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:

iv. commercial building or buildings with a total Gross External Area of up to 1,000,000m^2 which would sit within current Use Classes E (a)- (g), B2, B8 and sui generis floorspace uses and

v. a range of buildings up to 100,000m^2 within Use Classes C1, C2, E (a) – (g), F, B8, including restaurants / cafes, shops, leisure, education and sui generis uses; and

vi. 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.

10.1.10 Various elements of the Extant Consent have been implemented, including the following:

- The Gravity Link Road onto the A39. Construction of the road, along with some other changes to the A39 Hall Road and A39 Hillside junctions, is scheduled to open in October/November 2021. Whilst the primary function of the Gravity Link Road is to provide a strategic access to the Site, it will also provide a range of 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.

- A new 'green bridge', connecting Puriton with the land to the south has been constructed.

- The Village Enhancement Scheme (VES), an obligation within the Section 106 agreement, has achieved planning consent and is passing through the technical approval process with Somerset County Council (SCC) 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. The VES will 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.

- Partial signalisation works to Junction 23 of the M5 have been completed by other parties. The improvement works completed removes the need for the Extant Consent to improve Junction 23 in line with the Section 106 obligation, and the capacity of the junction has been increased in anticipation of the additional traffic that could be generated by the HEP scheme. Contributions have also been made by This is Gravity Ltd to advanced transport modelling and assessment work.

10.1.11 This TA has been prepared within the context that there is a growing evidence base demonstrating a shift in travel behaviour because of disruptive technological and societal changes, in particular amongst the younger generations for whom a significant part of future development demand applies.

10.1.12 There is widespread evidence demonstrating that there is less reliance on the car from younger generations, aspiration to socialise or work while travelling, high costs of car ownership and change in priorities of spend (car not being a status symbol) all leading to a consensus that future travel behaviour will lead to lower levels of private car use.

10.1.13 Furthermore, advances in vehicle technologies such as electric vehicles and autonomous vehicles create opportunities to rethink established means of delivering transport solutions.

10.1.14 This research, in combination with many other evidence bases, is therefore questioning the validity of traditional 'Predict and Provide' transport appraisal assumptions in forecasting future travel demands and traffic levels.

10.1.15 This TA has set out a 'Vision and Validate' assessment which considers the potential future operational performance of the road network, moving away from the increasingly inaccurate traditional 'Predict and Provide' assessment approach and taking into account travel trends evidence, the capacity for the existing network to accommodate future growth, and wider transport interventions encouraging sustainable travel.

10.1.16 Comprehensive transport scoping discussions have been undertaken with various stakeholders through a Gravity LDO Transport Working Sub Group where regular meetings and workshops have taken place since November 2020. The purpose of the sub-group has been to provide regular project updates as part of an extensive pre-application consultation exercise discussing emerging plans and assessment methods, to understand the key deliverables and discuss mobility strategies for the site.

10.1.17 A full review has been undertaken to identify the national and local transport and planning policies and guidance that are most applicable to the Proposed Development. It has been concluded that Gravity is in full alignment with planning for sustainable development, and thus the objectives of current national and local transport policy.

10.1.1 There is significant uncertainty around the future transport impacts of the Gravity development proposal, both because this TA and the accompanying FTP are in support of an LDO, and hence it is not currently known who the final occupiers of the site will be, what the final scale

and type of development will be, whether it will be delivered on a phased basis and also because there is uncertainty around how we will travel in the future as we have to adapt to a low carbon future.

10.1.2 Notwithstanding this, the clear intent of Gravity is for clean growth, minimising the transport impact associated with the development, with a strong package of sustainable measures to reduce car dependency. To understand this in the context of Gravity, an assessment of the range of possible futures has been undertaken to best understand how the development could be managed to achieve one of the 'Preferred Futures' and to ensure that undesirable or unlikely futures do not happen.

10.1.3 A bespoke Scenario Testing tool has been developed to enable the running of a wide number of potential development scenarios and to demonstrate that there are a number of different sustainable futures that would be considered as 'Preferred Futures' for the development and operation of the Gravity development.

10.1.4 The Scenario Testing 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.

10.1.5 The Scenario Testing tool has been used to identify a single 'Core Scenario' for testing which is based on a comprehensive sustainable package of transport measures, with a reduced vehicle generation outcome that could be achieved in a number of different ways. In addition, the approved HEP scenario has been retested through this spreadsheet tool and a 'Business As Usual' (BAU) alternative Gravity assessment. This has been undertaken at the request of SCC and NH as a comparable against the 'Core Scenario'. The BAU test reflects a worst-case assessment as it does not incorporate the enhanced Gravity measures that would achieve the proposed step change in sustainability.

10.1.6 In determining what is acceptable as a worst-case Preferred Future, the key constraint has been a target in the peak traffic periods to not exceed traffic already approved for the HEP extant planning consent with the clear aim to reduce the traffic impact to a level below this. The number of trips this cap relates to is 1,367 vehicles in the higher AM peak and an equivalent approximate 84% mode share as car driver.

10.1.7 There is potential to re-open the disused rail line connecting the site to the main Exeter-Bristol line to facilitate both passenger and rail freight services. However, any requirement for rail will be linked to end occupier needs. If rail is reinstated, this facility could lead to the reductions in future Gravity passenger and freight traffic movements. However, for the purpose of detailed impact assessments set out within this TA and resulting travel demand calculations and mode share targets, it has been assumed (as a worst case in terms of traffic impact) that the planned rail facility may not be delivered.

10.1.8 The Gravity development proposals have been framed around a clear vision for the site and client ambitions and given the nature of the LDO process, the development proposals have been expressed by an overarching 'description of development' and a series of LDO Parameter Plans, alongside a supporting LDO Design Guide (prepared under separate cover).

10.1.9 The Gravity development proposals seek to inherently manage travel demands through the delivery of a mix of land uses supporting the primary employment site, these include:

- A commitment to manage shift patterns to maximise sustainable travel opportunities for employees and limit residual traffic impacts in the traditional network weekday AM and PM peak periods.

- Provision of supporting (e.g., retail, leisure, health) land uses specifically for employees and/or on-site residents (with the exception of the 37 Club which is to be retained for wider community use/access in line with existing arrangements).

- Residential development for on-site employees and to be subject to appropriately worded conditions linking occupation to employment on site.

10.1.10 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, whilst also being resilient to future travel patterns and systems.

10.1.11 The Gravity Transport Mobility Strategy will focus on each of the following elements:

- Reducing the need to travel
- Reducing travel distances - creating sustained, better quality employment locally
- 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
- Improving rail connectivity for passengers and freight
- Parking management principles
- Reducing car trips

10.1.12 It is anticipated that all of the above can be combined into an overall service package for Gravity, that can be provided to users via Mobility as a Service (MaaS).

10.1.13 Primary site access will be achieved via the Gravity Link Road which is due to be completed in October / November 2021. Secondary access requirements will be determined by end occupiers and proposed through future LDO Compliance Applications, however this TA has demonstrated a number of potential options for access from Woolavington Road which could be investigated further.

10.1.14 Within the development the campus will be designed to prioritise the use of sustainable modes of transport, including the potential reinstatement of rail access for both passenger and freight services.

10.1.15 Off site, proposals will ensure that there are attractive provisions to encourage walking, cycling, Micro Mobility and public transport trip making. Discussions with SCC officers have also taken place in respect of wider off-site connections including toward Bridgwater Town Centre and Bridgwater Train Station as part of a Gravity offsite Pedestrian, Cycle and Micro Mobility strategy.

10.1.16 The indicative bus service proposals outlined at this stage are as follows, with times of operation and service frequencies would be dependent on shift patterns and working hours on site:

- Timetabled service G1 operating between Bridgwater, Gravity and Street and also serving Puriton and Woolavington

- Timetabled service G2 operating between Burnham, Highbridge and Gravity and also serving Woolavington.
- Demand responsive services from western and southern estates in Bridgwater, including Northfield, Haygrove, Wembdon and Hamp, and extending to North Petherton.
- Other demand responsive services as required to support travel from villages to the north and east around the Gravity site.

10.1.17 A Car Parking Management Plan will be prepared as part of any future LDO Compliance Application. Further details on the proposed content for the document is set out in Section 4 of the FTP.

10.1.18 The FTP provides the approach for active mobility management measures to be implemented to carry this through to the operational phases of the development, and provisions on site are adaptable to make the most of future changes in travel trends and technological advancements.

10.1.19 The transport appraisal methodology developed to assess the Gravity development takes account of the following:

- The LDO route being followed offers significant flexibility over the final development mix which will be market led.
- The large scale and atypical nature of the development proposed.
- The SDC Transport Model tool being unsuitable for full use which does not align with the LDO programme.

10.1.20 The peak hour light vehicle traffic generation demands have been calculated by the bespoke Scenario Testing tool that has been developed specifically for this LDO and reflect the transport proposals for the Site as set out. The HGV traffic generation has been forecast using an alternative first principles methodology based on maximum production output.

10.1.21 The travel demands assessment has demonstrated the following:

- The travel demand in the Gravity Core Scenario is significantly lower than the BAU scenario in all time periods.
- Both the Gravity Core and BAU scenarios generate travel demands lower than the HEP Extant Consent scenario during the weekday peak hours.
- The daily travel demand for both Gravity Core and BAU scenarios are greater than the HEP Extant Consent scenario.

10.1.22 The impact assessment results have been set out for two Gravity scenarios – the Core and BAU scenarios – with the former being the primary focus and the latter specifically requested by SCC / NH. The Gravity impacts have also been compared against the impacts associated with the HEP Extant Consent.

10.1.23 To carry out the assessment, a 2032 future base year has been created through the allowance of projected background traffic growth, and the addition of committed development and Hinkley Point C trip generations.

10.1.24 The assessment methodology adopted is robust and appropriate given the current stage of the LDO process. It has allowed the potential need for future highway mitigation to be

identified, although the need for mitigation should be considered in the context of the comparable impact between the Gravity Core Scenario and the HEP Extant Consent scenario.

10.1.25 The A38 Dunball Roundabout, Site Access / Woolavington Road roundabout and the A39 Puriton Hill / Gravity Link Road roundabout are all forecast to operate without significant capacity constraint under the Gravity Core Scenario in 2032.

10.1.26 The 2032 forecast year junction assessments undertaken have indicated potential capacity constraints at the M5 Junction 23 under its existing layout, even without the HEP or Gravity development included.

10.1.27 The Site already benefits from the HEP Extant Consent, and it has been demonstrated that the Gravity Core and BAU scenario traffic demand impacts are lower than the HEP scenario in the peak hours.

10.1.28 A 2024 interim assessment has been undertaken on the basis this is considered to be the earliest possible opening year for Gravity and it also aligns with the requirements of the DfT Circular 02/2013. This has demonstrated that the existing Junction 23 would operate within capacity in the 2024 future base year without any development at the Site included.

10.1.29 It could be considered that the most appropriate time to undertake more detailed analysis of this junction would be at the LDO Compliance Application stage when there would be greater certainty over the end occupier(s) and the scale / form of development coming forward at Gravity. Notwithstanding this, it is noted that SCC / NH may wish to see if a mitigation scheme can be provided and capable of mitigating potential future impacts.

10.1.30 A potential mitigation scheme has therefore been explored for M5 Junction 23 in light of the capacity analysis findings set out. The associated modelling demonstrated that the improved junction (based on the potential mitigation scheme) would be expected to operate within capacity under both the Gravity Core and BAU Scenarios.

10.1.31 It should also be noted that the Gravity development under the Core Scenario is forecast to have a significantly lower peak period vehicle trip generation and corresponding impact than the HEP Extant Consent traffic. That development could be delivered without any further requirement for improvement at Junction 23.

10.1.32 Refinements could be made to the assessments undertaken in the future to account for the effectiveness of travel demand measures and behaviour change using updated data, potentially including re-assessment of the scheme using the NH Paramics model if a suitable forecast year model becomes available. The appropriate time to undertake such an assessment would be as part of any first LDO Compliance Application.

10.1.33 Chapter 9 provides a summary of the transport mitigation measures identified to support the Gravity development proposal as defined by the 'Core Scenario' and outlines the proposed approach as to how these measures will be secured through the LDO process.

10.1.34 These measures are summarised in **Table 9-1** and range from on-site proposals including a mix of land uses proposed to minimise travel, prioritisation of movement within the site by sustainable modes and managing parking, through to off-site proposals including improved bus services to the site and off-site pedestrian/cycle and highway infrastructure improvements.

10.1.35 The measures outlined in **Table 9-1** are considered to be required to support/mitigate the Gravity development proposals as defined by the single set of land use assumptions used within this assessment. Accordingly, they represent an outline package of measures that are likely to be required for a development of this scale/type but remain subject to review following confirmation of the development proposals required by the end occupier and managed through future LDO Compliance Applications.

10.1.36 It is anticipated that the measures outlined in **Table 9-1** will be incorporated into a broader LDO Mitigation Checklist against which any future LDO Compliance Application will be assessed with supporting evidence required to demonstrate which measures are required, which measures are not required and how they will be delivered.

10.1.37 All LDO Compliance Applications will therefore need to demonstrate what specific mitigation is required with reference to each of the nine numbered items in **Table 9-1,** with the details and scale of any mitigation linked to the type/scale of the development proposed within the respective LDO Compliance Application.

10.1.38 Fundamental to the success and effectiveness of the integrated mitigation measures will be the requirement to set overall trip/movement targets by mode and to monitor against the effectiveness of the measures to ensure that Gravity is on track to deliver against the targets. This will be achieved through the preparation and implementation of a broader site Monitor and Manage plan.

10.1.39 The measures detailed in **Table 9-1** are proposed to limit travel demands arising from the development proposals and seek to achieve preliminary modal shift targets as identified within the FTP and to limit network traffic impacts in the traditional AM and PM peak periods to levels below the HEP Extant Consent.

10.1.40 As part of future LDO Compliance Applications, it is anticipated that any specific mitigation measures required to support delivery would be linked to an ongoing Monitor and Manage arrangement to track if the actual operational development travel demands are in line with the predicted demands.

10.1.41 At this stage it is anticipated that the primary monitoring mechanism in respect of mitigation measures will be to monitor off-site multi-modal trips to assess actual trip generation against the identified preliminary mode share targets set out. The monitoring methodology and frequency for reporting would be set out as part of a future Compliance Application, and will need to allow for an agreed time period by when the targets should be expected to be met from 1st occupation.

10.1.42 In addition to this, any requirement for site-specific highway capacity or safety improvements (ID 9 within Table 9-1) may be triggered if the actual car driver mode share exceeds the preliminary mode share target for off-site multi-modal trips and if peak period highway impacts are predicted to exceed the peak period vehicle trip generation set out. The monitoring methodology and frequency for reporting would be set out as part of a future LDO Compliance Application, and will need to allow for an agreed time period from when the agreed targets should be expected to be met from first occupation.

10.1.43 The delivery of this outline package of mitigation remains subject to ongoing discussions with the highway and planning authorities.

10.1.44 Should there be a requirement for further mitigation there will also be the opportunity to seek delivery of additional transport improvements including those set out within the LDO Locality Investment Plan.

10.1.45 The draft LDO Locality Investment Plan provided as part of this TA sets out high level potential schemes which may be required to realise the full delivery of the EZ and to mitigate the potential impacts of the LDO including aspects forming part of the TA / FTP.

10.1.46 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 measures.

10.1.47 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.

10.1.48 Arrangements for implementation of the measures referred to here will be found variously in the LDO Design Guide, the LDO itself and any s106 agreement connected to the LDO.

10.1.49 In respect of the early need for infrastructure delivery ahead of development, it is possible that through the LDO Locality Investment Plan the market may choose a more incremental solution, with challenging infrastructure and timing needs, and this may require borrowing in advance (pump priming), to be refunded through future business rates income.

10.1.50 The Transport authority will be an integral member of the Transport and Infrastructure Management Group and will be responsible for commissioning and implementing schemes and mitigation measures to improve outcomes and reduce impacts, funded via the locality investment plan and retained business rates from the EZ. The challenge will be for the local authority to commission and deliver schemes in a timely way to manage and reduce impacts.

10.1.51 As local government review proceeds and the proposed new unitary is established in 2023 it will be 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.

10.1.52 A number of transport schemes are included in the LDO Locality Investment Plan including:

- On-site schemes, including:
  - Establishing a revolving infrastructure fund to accelerate site preparation, and to be refunded by business rates to expedite commissioning and delivery.
  - On site strategic transport priorities: estate roads and mobility network linked to the transport assessment
  - Rail restoration and station
  - Multi story car parking with integral EV Charging
  - Any other initiative included within the FTP not defined elsewhere
  - Smart mobility hubs
- Off-site schemes, including:
  - High frequency bus services to Gravity (linked to transport assessment)
  - M5 J23 Strategic improvement (linked to transport assessment)
  - Active travel improvements across Bridgwater: Bridgwater to Gravity walking and cycling links (including A38 and A39 corridors) linked to transport assessment
  - Other potential transport improvements on the Major Road Network / Local Road Network, including Dunball Rbt and the A38 / A39 corridors
  - Park and ride facilities

- Smart Mobility Hubs within Bridgwater (linking to Gravity)
- Burnham on Sea / Highbridge to Gravity walking and cycling improvements

- Innovation, Skills and Training, including:
  - Innovation / SME space related to supply chain development
  - Drone / EVTOL logistics - trials / business case development
- Minor Improvement Projects, including:
  - Walking and cycling enhancements within the villages
  - Enhanced village signage / wayfinding
- Locality Projects, including:
  - EV Infrastructure in Bridgwater
  - Bridgwater Rail Station Accessibility Enhancements
  - Digital investment – superfast broadband, 5G
  - Mass transport connectivity to Bristol Airport from Gravity and Bridgwater
  - Admin and Governance, including officer time including statutory consultations, Transport and Infrastructure Manager

10.2 Conclusions

10.2.1 Given the nature of an LDO, there remains significant uncertainty on the final scheme details and end occupier(s).

10.2.2 The Vision and Validate and Scenario Testing assessment undertaken has provided an indication of the potential scale of transport impact, including a comparative assessment against the HEP Extant Consent on the local and strategic road network surrounding the site against which future LDO Compliance Applications can be assessed.

10.2.3 This assessment has concluded that a flexible package of sustainable transport measures is appropriate and capable of mitigating the potential impact of a large scale advanced manufacturing type facility with high output productivity to off site traffic levels lower than those that would be associated with the Extant Consent.

10.2.4 Managing travel demand by maximising sustainable travel options at this site is embedded within the site design and development approach.

10.2.5 A ‘Monitor and Manage’ approach, which will be used to track multi-modal trips generated by Gravity to inform future adjustments to the investment in sustainable modes whilst also tracking peak period vehicle trip generation, will provide SCC / NH assurances regarding the peak period operational performance on the highway network surrounding the site.

10.2.6 On the basis of the above, it is concluded that there are no material highways and transport reasons as to why the LDO should not be approved, subject to securing the necessary package of transport measures through future LDO Compliance Applications or appropriate legal agreement.

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