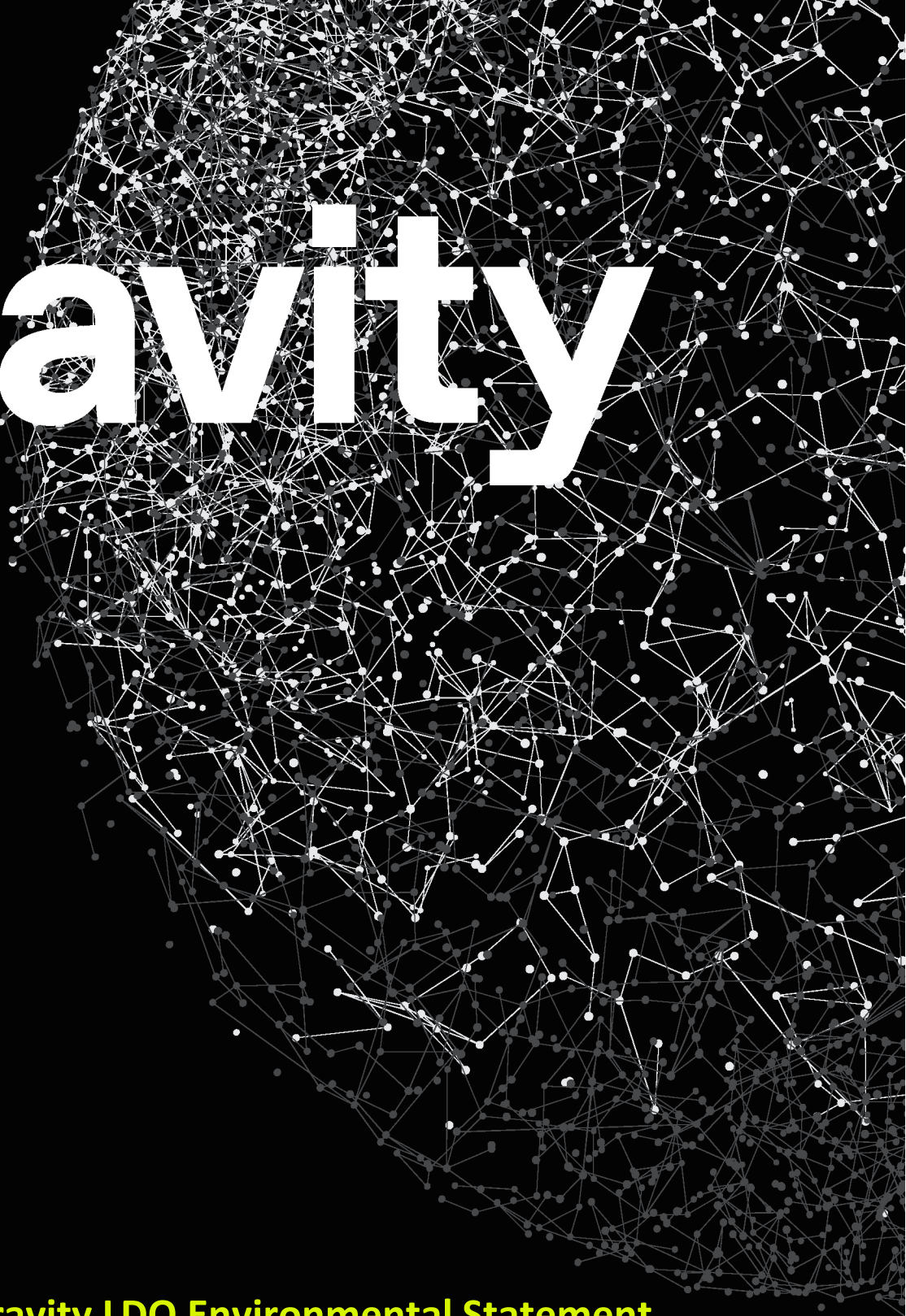
Gravity

Smart Campus



Gravity LDO Environmental Statement

Volume 1 – Chapter 11:
Air Quality

11 Air Quality

11.1 Introduction

11.1.1 This Chapter has been prepared by Stantec. In accordance with Regulation 18(5) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this ES is provided in **Appendix 1.6**.

11.1.2 This Chapter sets out the assessment of likely significant effects of the Proposed Development upon air quality. It describes the existing air quality within the study area and assesses the impact of the construction (including demolition) and operation of the Proposed Development on air quality.

11.1.3 The main air pollutants of concern related to construction activities are dust and particulate matter (PM_{10}), and for road traffic are nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$ and NO_2 emissions associated with the proposed plant. As well as emissions of NO_2, PM_{10}, $PM_{2.5}$, and Benzene from the industrial stacks. The main pollutants of concern for the assessment of the significance of the Proposed Development on ecological receptors are Oxides of nitrogen (NOx), Ammonia (NH_3) and Sulphur Dioxide (SO_2), nitrogen deposition and acidification. This Chapter is supported by further detailed information contained within the following Appendices:

- Appendix 11.1: Environmental Protection UK (EPUK) / Institute of Air Quality Management (IAQM) Screening Criteria
- Appendix 11.2: IAQM Dust Guidance (2014) Approach
- Appendix 11.3: Model Input and Results Processing
- Appendix 11.4: Human Health and Ecological Receptor Locations
- Appendix 11.5: Ecological Receptors Modelling Results
- Appendix 11.6: Glossary.

11.2 Policy, Legislation, Guidance and Standards

Air Quality Regulations

11.2.1 The Air Quality (England) Regulations 2000 (AQR) defined National Air Quality Objectives (NAQOs, a combination of concentration-based thresholds, averaging periods and compliance dates) for a limited range of pollutants. This was carried out for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. Subsequent amendments were made to the AQR in 2001 and 2002 to incorporate 'limit values' and 'target values' for a wider range of pollutants as defined in European Union (EU) Directives.

11.2.2 These amendments were consolidated by the Air Quality Standards Regulations 2010[1] (AQSR) (with subsequent amendments most notably in 2016 and for the devolved administrations), which transposed the EU's Directive 2008/50/EC on ambient air quality and cleaner air for Europe into the UK. The 2010 Regulations now have the status of retained EU

[1] The Air Quality Standards Regulations 2010 (legislation.gov.uk)

law pursuant to the European Union (Withdrawal) Act 2018[2]. The 2010 Regulations set out that the limit values apply everywhere within England with the exception of:

- Any locations situated within areas where members of the public do not have access and there is no fixed habitation
- In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply
- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.

11.2.3 The relevant AQOs for this assessment have been taken from Schedule 2 of AQSR 2010 as shown in **Table 11.1**.

Pollutant	Time Period	Objectives	Source
NO_2	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year	NAQO and EU limit value
	Annual mean	40 µg/m^3	NAQO and EU limit value
PM_{10}	24-hour mean	50 µg/m^3 not to be exceeded more than 35 times a year	NAQO and EU limit value
	Annual mean	40 µg/m^3	NAQO and EU limit value
$PM_{2.5}$	Annual mean	25µg/m^3	Stage 1 limit value by 2015 - NAQO and EU limit value
	Annual mean	20µg/m^3	Stage 2 limit value by 2020 - EU Directive

Table 11.1 Relevant Air Quality Objectives / Limit Values

11.2.4 The NAQOs for NO_2 and PM_{10} were to have been achieved by 2005 and 2004 respectively, but also continue to apply in all future years thereafter.

11.2.5 The 2019 Clean Air Strategy includes a commitment to set a "*new, ambitious, long-term target to reduce people's exposure to $PM_{2.5}$*" which the proposed Environment Bill 2019-2021[3] commits the Secretary of State to setting. For the purposes of this assessment it is appropriate to apply the EU Directive Stage 2 limit value for $PM_{2.5}$ and give consideration to future potential changes.

National Air Pollution Plan for NO_2 in the UK

11.2.6 The national Air Quality Plan for NO_2 (DEFRA, 2018) sets out how the Government plans to deliver reductions in NO_2 throughout the UK, with a focus on reducing concentrations to below the EU Limit Values throughout the UK within the 'shortest possible time'.

11.2.7 The plan requires all Local Authorities (LAs) in England which DEFRA identified as having exceedances of the Limit Values in their areas past 2020 to develop local plans to improve air quality and identify measures to deliver reduced emissions, with the aim of meeting the Limit Values within their area within "*the shortest time possible*". Potential measures include

[2] Statutory Instrument. (2018) European Union (Withdrawal) Act 2018, No. 1313.

[3] Yet to be enacted

changing road layouts, encouraging public and private ultra-low emission vehicle (ULEV) uptake, the use of retrofitting technologies and new fuels and encouraging public transport. In cases where these measures are not sufficient to bring about the required change within 'the shortest time possible' then LAs may consider implementing access restrictions on more polluting vehicles (e.g. Clean Air Zones (CAZs)). A CAZ is defined within the plan as being "*an area where targeted action is taken to improve air quality and resources are prioritised and coordinated in a way that delivers improved health benefits and supports economic growth*" and may be charging or non-charging.

The Air Quality Strategy

11.2.8 Part IV of the Environment Act 1995 (Environment Act, 1995) required the Secretary of State to prepare and publish a national air quality strategy (AQS) containing standards, objectives and measures for improving ambient air quality and to keep these policies under review.

11.2.9 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK (DEFRA, 2007). The primary objective of the Air Quality Strategy is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Air Quality Strategy sets out the NAQOs and Government policy on achieving these.

11.2.10 The Clean Air Strategy (2019) (CAS) aims to lower national emissions of pollutants, thereby reducing background pollution and minimising human exposure to harmful concentrations of pollution. The Strategy aims to create a stronger and more coherent framework for action to tackle air pollution (DEFRA, 2019a). The CAS does not set legally binding objectives, instead it has targets for reducing total UK emissions of nitrogen oxides (NOx) and fine particulate matter ($PM_{2.5}$) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery or NRMM).

Local Air Quality Management

11.2.11 Part IV of the Environment Act 1995 (Environment Act, 1995) introduced a system of Local Air Quality Management (LAQM) which requires local authorities to regularly and systematically review and assess air quality within their boundary and appraise development and transport plans against these assessments. The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002. In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values although compliance dates differ.

11.2.12 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the NAQOs within its AQMA.

11.2.13 The Local Air Quality Management Technical Guidance 2016 (LAQM.TG(16); DEFRA, 2018), issued by the Department for Environment, Food and Rural Affairs (DEFRA) for Local Authorities provides advice on where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year) as summarised in **Table 11.2**.

Averaging Period	NAQOs should apply at:	NAQOs don't apply at:
Annual mean	All locations where members of the public might be regularly exposed For example: Building façades of residential properties, schools, hospitals, care homes etc	Façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residences Kerbside sites Any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean NAQO would apply, together with hotels and gardens of residences	Kerbside sites Any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean NAQOs apply as well as: Kerbside sites Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside locations where the public would not be expected to have regular access
15-minute mean	All locations where members of the public might reasonably be regularly exposed for a period of 15 minutes or longer.	

Table 11.2 Relevant Public Exposure

Statutory Nuisance

11.2.14 Section 79(1)(d) of the Environmental Protection Act 19904 defines one type of 'statutory nuisance' as "any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance". Where a Local Authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. Best practicable means is a widely used defence by operators, if employed to prevent or to counteract the effects of the nuisance.

Protection of Habitats

11.2.15 As well as their potential to impact on human health, some air pollutants have long been acknowledged to have effects on vegetation and freshwater systems. Whilst direct impacts of air pollutants on fauna are less common, any such effect on the health of vegetation or freshwater systems can then affect animal species that are dependent on the vegetation.

[4] Parliament of the United Kingdom (1990) Environmental Protection Act 1990

11.2.16 Biodiversity 2020 is the latest biodiversity strategy for the UK (DEFRA, 2020) and aims to “halt biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks…”. The Strategy recognises air pollution as a direct environmental pressure on biodiversity and planning and development as one of the sectors with the greatest potential for direct influence.

11.2.17 The Conservation of Habitats and Species Regulations 2017 (Statutory Instrument, 2017) (the Habitats Regulations), transposed the Habitats Directive (European Council Directive 92/43/EEC) in England and Wales. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Statutory Instrument, 2019) amends the 2017 Habitats Regulations to reflect the UK’s departure from the EU and came into force following the end of the Transition Period in December 2020.

11.2.18 The Habitats Regulations require the UK Government to introduce a range of measures for the protection of habitats and species. Special Areas of Conservation (SACs) are designated under these regulations, as are Special Protection Areas (SPAs). These sites form a network termed ‘Natura 2000’ and collectively these sites are known as European Sites, or the ‘national site network’.

11.2.19 Designated Wetlands of International Importance (known as Ramsar sites) do not form part of the national site network. Many Ramsar sites overlap with SACs and SPAs, and may be designated for the same or different species and habitats. All Ramsar sites remain protected in the same way as SACs and SPAs.

11.2.20 The Habitats Regulations primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna.

11.2.21 In addition, the Habitats Regulations require the competent authority to evaluate whether a project or plan has the potential to give rise to a “likely significant effect” and where this is the case, an “appropriate assessment” is required to determine whether the development will adversely affect the integrity of the site.

11.2.22 Sites of national importance may be designated as Sites of Special Scientific Interest (SSSIs) and improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way (CROW) Act 2000. If a development is “likely to damage" a SSSI, the CROW act requires that a relevant conservation body (i.e. Natural England) is consulted. The CROW act also provides protection to local nature conservation sites, which can be particularly important in providing 'stepping-stones' or 'buffers' to SSSIs and other sites designated under the Habitat Regulations.

Critical Levels

11.2.23 Critical levels are a quantitative estimate of exposure to one or more airborne pollutants in gaseous form, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

11.2.24 Critical levels for NOx for the protection of vegetation and ecosystems have been set by the UK Government within the AQSR as summarised in **Table 11.3** and are the same as the EU limit values and Natural England applies the objective to all internationally designated conservation Sites and SSSIs.

Pollutant	Time Period	Objective
Oxides of nitrogen (expressed as NO_2)	Annual mean	30 µg/m^3
	24-hour mean	75 µg/m^3
Ammonia (NH_3)	Annual mean	3 µg/m^3 (unless lichens or bryophytes are present, then 1 µg/m^3)
Sulphur dioxide (SO_2)	Annual mean and winter average	20 µg/m^3

Table 11.3 Vegetation and Ecosystem Objectives

Critical Loads

11.2.25 Critical loads for nitrogen deposition onto sensitive ecosystems have been identified by the United Nations Economic Commission for Europe (UNECE). They are defined as the amount of pollutant deposited to a given area over a year, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

11.2.26 In relation to combustion emissions, critical loads for eutrophication and acidification are relevant which can occur via both wet and dry deposition; however, on a local scale only dry (direct deposition) is considered significant.

11.2.27 Empirical critical loads for eutrophication (derived from a range of experimental studies) are assigned based for different habitats, including grassland ecosystems, mire, bog and fen habitats, freshwaters, heathland ecosystems, coastal and marine habitats, and forest habitats and can be obtained from the UK Air Pollution Information System (APIS) website (APIS, 2020)

11.2.28 Critical loads for acidification have been set in the UK using an empirical approach for non-woodland habitats on a 1km grid square based upon the mineralogy and chemistry of the dominant soil series present in the grid square, and the simple mass balance (SMB) equation for both managed and unmanaged woodland habitats.

National Planning Policy

11.2.29 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how they should be applied (Ministry of Housing, Communities & Local Government, 2021). The following paragraphs are considered relevant from an air quality perspective.

11.2.30 Paragraph 104 on promoting sustainable transport states:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: …

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; …"

11.2.31 Paragraph 105 goes on to state:

"Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health."

11.2.32 Paragraph 174 on conserving and enhancing the natural environment states:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land stability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans, and…"

11.2.33 Paragraph 185 within ground conditions and pollution states:

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

11.2.34 Paragraph 186 states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

11.2.35 Paragraph 187 states that:

"*Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed".*

Local Planning Policy

Sedgemoor Local Plan 2011-2032

11.2.36 The Sedgemoor Local Plan (2011-2032) sets out the policy framework for future development in the District and was formally adopted in February 2019 (SDC, 2019). Policy D24 Pollution Impacts of the Development states:

"*Development proposals that are likely to result in levels of air, noise, light or water pollution (including groundwater), vibration or soil contamination that would be unacceptably harmful to other land uses, human health, tranquillity, or the built and natural environment will not be supported. Where there are reasonable grounds to suggest that a development proposal may result in a significant adverse environmental impact, taking into account the sensitivity of the location, the Council will require planning applications to be supported by assessments relating to:*

- Air pollution
- *Noise pollution and/or vibration;*
- *Light pollution;*

- *Carbon Emissions;*
- *Contaminated Land/soil;*
- *Waste;*
- *Water pollution;*
- *Odour; and*
- *Any other sources.*

Where it is demonstrated that it is possible to manage the potential adverse impacts of the development proposal through its design or mitigation measures, the Council will, by means of condition or legal agreement, seek to ensure such measures are effective, for example by imposing limitations on matters including hours of operation, emission of fumes, noise and light, parking and servicing for both construction and operational stages.

In order to protect and improve water quality, potentially contaminating development proposals on aquifers or within Source Protection Zones will need to demonstrate that groundwater and surface water is adequately protected from pollution to prevent a deterioration of water quality of the water source. Development proposals adjacent to a watercourse should incorporate measures to protect the watercourse consistent with the actions of the River Basin Management Plan. The incorporation of SuDS within development proposals that protect and improve water quality will be supported…"

Puriton Energy Park SPD

11.2.37 SDC prepared this Supplementary Planning Document (SPD) to examine the potential of the brownfield site of the former Royal Ordnance Factory (ROF) located at Puriton (SDC, 2012). The SPD seeks to define, through development principles, the role, function, and character of the proposed Energy Park with the objective to achieve sustainable high-quality development. There is no specific policy that relates to air quality; however, the SPD states an air quality assessment is required to support the planning application. The SPD informed the subsequent Huntspill Energy Park application and the environmental assessment process which accompanied it. Since this time, design principles have been agreed for this application.

Bridgwater Vision

11.2.38 The Bridgwater Vision sets out the 50-year regeneration strategy for Bridgwater (SDC, 2015). It sets out a regeneration framework for the town, demonstrating how the town's environment will meet the highest 21st century aspirations of its people and businesses. The document sets out how Bridgewater is to become an exemplar for sustainable and contemporary development through further integration of energy generation, green infrastructure, air quality improvements, sustainable transport and flood prevention measures to ensure that Bridgwater is resilient and able to adapt to climate and economic change.

Guidance

Improving Air Quality in the UK: Tackling Nitrogen Dioxide in our Towns and Cities. UK Air Quality Plan for Tackling Nitrogen Dioxide, 2017

11.2.39 The UK Government was required by the High Court to release an Air Quality Plan to meet the NO_2 Limit Value in the shortest timescale as possible. This document was published on 26th July 2017. The plan focuses on reducing concentrations of NO_x and NO_2 around road vehicle emissions within the shortest possible time. The measures set out in the Plan provide measures relevant to national government and local authorities which are not relevant to the operation or design of the Development.

DEFRA 'Local Air Quality Management Technical Guidance (LAQM.TG(16))'

11.2.40 Defra LAQM.TG(16) was published for use by local authorities in their LAQM review and assessment work (Defra, 2021). The document provides key guidance on aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

EPUK / IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'

11.2.41 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have together published guidance to help ensure that air quality is properly accounted for in the development control process (EPUK / IAQM 2017). It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

IAQM 'Guidance on the Assessment of Dust from Demolition and Construction'

11.2.42 Guidance on the assessment of dust from demolition and construction has been published by the IAQM (IAQM, 2014). The guidance provides a series of matrices to determine the risk magnitude of potential dust sources associated with construction activities in order to identify appropriate mitigation measures that are defined within further IAQM guidance.

IAQM 'Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites'

11.2.43 The IAQM has published guidance on the assessment of air quality impacts on designated nature conservation sites (IAQM, 2019) which adopts a similar procedure to that detailed in Natural England guidance on the assessment of road traffic emissions (Natural England, 2018) and identifies that exhaust pipe emission of ammonia is an additional relevant pollutant when assessing nitrogen deposition to sensitive ecological features.

11.3 Consultation

11.3.1 The EIA Scoping Report was submitted to SDC in June 2021, a Scoping Opinion was received in September 2021, and SDC confirmed that they were satisfied that appropriate human health receptors and effects have been identified within the scope of the air quality ES topic and that air quality should be scoped in to the ES.

11.4 Methodology

Study Area

11.4.1 The study area adopted for the demolition and construction assessment is as follows:

- for the construction dust risk assessment, the study area (based on IAQM, 2014 guidance) is defined as comprising the area up to 350m from the Site boundary and 50m from the route used by construction vehicles (up to 500m from the Site entrance(s));
- for the construction phase road traffic emission assessment, the study area (based on the EPUK / IAQM, 2017 guidance) includes all roads (and adjacent properties) predicted to exceed the screening criteria outlined in **Table A11.3.1**, **Appendix 11.2**.

11.4.2 The study area adopted for the operational phase assessment is as follows:

- for the operational phase road traffic emissions assessment, the study area (based on EPUK / IAQM, 2017 guidance) includes the Site, all roads (and adjacent properties) within 250m of the Site boundary and any roads predicted to exceed the criteria.

11.4.3 For the assessment of the potential indirect impact of stack emissions on ecological receptors the screening criteria outlined by the EA guidance (EA, 2016) has been used. This guidance requires that designated ecological sites should be assessed if they are located within the following distances from the emission source:

- Special Protection Areas (SPAs), Special Area of Conservation (SACs) or Ramsar sites within 10 km; and / or
- Site of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and local nature sites (ancient woodland, Local Wildlife Sites (LWSs) and Local Nature Reserves (LNRs)) within 2 km.

Construction Dust Impacts

11.4.4 Guidance from the IAQM recommends splitting construction activities into four separate source categories and determining the dust risk associated with each of these individually. This assessment has determined the risk of each of the following source categories:

- Demolition
- Earthworks
- Construction
- Trackout (the transport of dust and dirt onto the public road network).

11.4.5 During demolition, earthworks and construction, dust from on-site activities and off-site trackout by construction vehicles has the potential to impact on sensitive human receptors within the study area; the main potential impacts are loss of amenity (as a result of dust soiling) and deterioration of human health (as a result of concentrations of PM_{10}). Activities also risk causing annoyance due to dust soiling and harm to ecological receptors.

11.4.6 The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source(s).

11.4.7 Separation distance is also an important factor. Large dust particles (greater than 30µm), can be potentially responsible for most dust annoyance, will largely deposit within 100 m of sources. Intermediate particles (10-30 µm) can travel 200-500 m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10 µm), which are the predominant fraction that can be potentially responsible for human health impacts largely remain airborne. However, the impact on the short-term concentrations of PM_{10} occurs over a shorter distance due to the rapid decrease in concentrations with distance from the source due to dispersion.

11.4.8 The risk of each source for dust effects is described as 'negligible', 'low risk', 'medium risk' or 'high risk' depending on the nature and scale of the construction activities and the proximity of sensitive receptors to the construction activities or site boundary. The assessment is used to identify appropriate mitigation measures proportional to the level of risk, to reduce the effects such that they are not significant.

Screening Assessment

11.4.9 The first stage of the assessment involves screening to determine if there are sensitive receptors within threshold distances of the activities associated with the construction phase of the scheme; defined as the study area. No further assessment is required if there are no receptors within the study area.

11.4.10 The IAQM guidance outlines that an assessment is only required in cases where:

- A 'human receptor' is located within:
  - 350 m of the boundary of the Site; OR
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).
- An 'ecological receptor' is located within:
  - 50 m of the boundary of the Site; OR
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

Further Assessment

11.4.11 The dust risk category defined for each dust source and effect is then used to determine appropriate site-specific mitigation measures to be adopted. It should be noted that in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation.

11.4.12 Although the construction is likely to be undertaken in phases, as is typical with large schemes, this Construction dust impact assessment assumes that each activity (earthworks, construction and trackout) may occur concurrently. This is a conservative assumption and will result in a higher level of identified pre-mitigated risk. It is also possible for material import to assist with ground preparation to be in advance through the remediation consent and the associated material management plans and construction traffic management plans.

11.4.13 The risk of impacts associated with dust soiling and PM_{10} caused by the Proposed Scheme has been determined (following the IAQM guidance) based on the dust emission class (or magnitude) for each activity arising from four activities in the absence of mitigation (demolition, earthworks, construction and trackout) as shown in **Table A11.2.1.**

11.4.14 The sensitivity of receptors is then defined (as 'high', 'medium' or 'low') for each dust effect (dust soiling, human health and ecosystem impacts) in accordance with the criteria presented in **Table A11.2.2** 'Receptor Sensitivity'.

11.4.15 The overall sensitivity of the surrounding area is determined for each activity using the matrices in **Appendix 11.2** based on the IAQM dust guidance approach in combination with indicative thresholds and professional judgement. The sensitivity of the area is based on the distance of the source from the closest receptors, the receptor sensitivity, and in the case of PM10 effects, the local background concentration. **Table A11.2.3** determines the sensitivity of an area to dust soiling effects. **Table A11.2.4** determines the sensitivity of an area to human health impacts and **Table A11.2.5** determines the sensitivity of an area to ecological impacts.

11.4.16 The risk of dust impacts arising is a product of the relationship between the dust emission magnitude and the area sensitivity and is based on the criteria outlined in **Table A11.2.6** based on the IAQM guidance. The risk of impact is then used to determine the mitigation requirements.

11.4.17 Results of the dust assessment are presented in [give section reference when known]

Construction Road Traffic Emissions

11.4.18 The potential for a significant overall effect on existing sensitive receptors within the Study Area because of emissions from demolition and construction traffic generated by the Proposed Scheme has been determined quantitatively, taking into consideration the screening criteria outlined in the EPUK / IAQM guidance (EPUK / IAQM, 2017) (see **Appendix 11.2**), the anticipated routing of the generated traffic and the anticipated duration of impacts associated with the generated traffic. If it is not possible to screen out the potential for significant impacts, then a detailed assessment will be undertaken.

Completed Development Traffic Emissions

Screening Assessment

Impacts of Development-Generated Traffic on Existing Sensitive Human Receptors

11.4.19 The potential for significant impacts on existing sensitive receptors within the study area as a result of emissions from traffic generated by the Proposed Development is determined based on the screening criteria outlined in the EPUK / IAQM guidance (see **Appendix 11.2** which includes consideration of the volume and composition of traffic generated by the Proposed Development and existing local air quality conditions (i.e. the presence of any declared AQMAs).

11.4.20 If it is not possible to screen out the potential for significant impacts, then a detailed assessment will be undertaken (see Paragraphs 11.4.20 to 11.4.25).

Site Suitability

11.4.21 A qualitative assessment to determine whether there is a potential for exceedances of the relevant NAQOs at residential locations within the Proposed Development has been undertaken, considering future baseline air quality conditions within and close to the Site, and the proximity of sensitive locations within the development to nearby sources of emissions.

Ecological Receptors

11.4.22 In relation to ecological receptors, a detailed (quantitative) air quality assessment of impacts is required if there are sensitive habitats (within designated sites) within 200 m of a road with a 'potentially significant change'. If there are no designated sites containing sensitive habitats within 200 m of the affected road, then no further assessment is required.

11.4.23 The potentially significant change could be associated with realignment (i.e. increased proximity to receptors), changes to speed (>10 kph) or flow. The applied screening criteria, based on professional judgement, for changes in road traffic flows due to the Proposed Development are as follows:

- A change of light-duty vehicle (LDV) flows of more than 50 annual average daily traffic (AADT) or heavy-duty vehicle (HDV) flows of 10 AADT for roads within 200m of Habitat Regulations Sites;
- A change of light-duty vehicle (LDV) flows of more than 100 annual average daily traffic (AADT) or heavy-duty vehicle (HDV) flows of 25 AADT for roads within 200m of SSSIs; and
- A change of LDV flows of more than 1000 AADT or HDV flows of more than 100 AADT for sensitive habitats within 200m of National Nature Reserves (NNRs) and local nature sites (i.e. ancient woodland, Local Wildlife Sites and Local Nature Reserves (LNRs)).

11.4.24 Based on professional judgement, changes in traffic flows below these criteria are considered to not have the potential to result in significant air quality impacts in isolation.

11.4.25 For identification of potential 'in-combination' effects at Habitat Directive Sites, the threshold of 1,000 AADT is applied to the change in 'in-combination' traffic flows.

Emissions from Railway

11.4.26 Diesel fired stationary locomotives can give rise to high short term NO_2 and SO_2 concentrations near railway stations or depots. Moving locomotives can contribute to elevated short term NO_2 and SO_2 concentrations close to the track. Local Air Quality Management Technical Guidance states that emission from locomotives can be screened out if none of the following criteria are met:

"Stationary diesel or steam locomotives:

- *locations where diesel or steam locomotives are regularly (at least three times a day) stationary for periods of 15-minutes or more; and*
- *Determine relevant exposure within 15m of the locomotives.*

Moving diesel locomotives:

- *relevant exposure within 30m of the railway tracks with heavy traffic of diesel passenger trains; and*
- *the background annual mean NO_2 concentration is above 25µg/m^3 in these areas."*

11.4.27 Based on the above criteria the emissions from locomotives from the restoration of the railway line for passenger and freight services are not significant and have not been considered further in the assessment.

Detailed Assessment

Human Receptors

11.4.28 Concentrations of pollutants (NO_2, PM_{10} and $PM_{2.5}$) have been predicted for a range of worst-case locations of relevant human receptor exposure both at sensitive existing properties and within the Proposed Development itself to allow comparison with the NAQOs and (for existing receptors only) determination of the significance of impacts at each receptor. The location of these receptors is presented in **Figure 11.1**.

11.4.29 Emissions from road vehicles and their resultant impact at receptor locations have been predicted using the ADMS-Roads dispersion model (v5.0.0.1). The model requires the user to provide various input data, including traffic flows (in AADT format), vehicle composition (i.e. the proportion of Heavy Duty Vehicles (HDVs)), road characteristics (including road width, gradient and street canyon dimensions, where applicable), and average vehicle speed. AADT flows and the proportions of HDVs, for roads within the study area have been provided by the Project's transport consultants, Stantec. Traffic data used in this assessment are summarised in **Appendix 11.3**.

11.4.30 The model also requires meteorological data and has been run using 2018 meteorological data from the Yeovilton meteorological station, which following a review of the characteristics of the Site and the meteorological site is considered suitable for this area. **Appendix 11.3** provides further details on the model inputs.

11.4.31 Traffic emissions have been calculated using the Emission Factor Toolkit (EFT) v10.1, which utilises NOx emission factors taken from the European Environment Agency (EEA) COPERT

5.3 emission tool. The traffic data were entered into the EFT to provide emission rates for each of the road links entered in the model. Road vehicular emissions are primarily associated with the exhaust emissions but also include particles generated from abrasion (of tyres, brakes and road). The EFT allows users to calculate road vehicle pollutant emission rates for NOx, PM_{10} and $PM_{2.5}$ (exhaust and brake, tyre and road wear) for a specified year, road type, vehicle speed and vehicle fleet composition.

11.4.32 Generally, concentrations of air pollutants in the UK are anticipated to decrease in the coming years as older vehicles are replaced with less polluting newer vehicles; as such, in most cases, the earlier the year that is assessed, the more worst-case the assessment is. The year 2032 has been identified as the assessment year for operational effects. This year has been identified as it is the end of the current Local Plan period and a date by which it is reasonable to assume that the development approved by the LDO will have been delivered.

11.4.33 Therefore, to take account of uncertainties relating to future year vehicle emissions and background pollutant concentrations to provide a conservative assessment, the assessment has been carried out utilising 2030 emission factors and background concentrations combined with traffic data from 2032 (which includes full development flows). This is considered a conservative assumption of emissions in the future.

Ecological Receptors

11.4.34 If a detailed assessment of impacts at ecological receptors is required, in addition to the EFT, emissions of ammonia (NH_3) will be calculated using the Calculator for Road Emissions of Ammonia (CREAM) tool (AQC, 2020b).

11.4.35 The ADMS Roads model will be used to calculate concentrations of NOx and NH_3 at a range of transects at increasing distances from the adjacent road network. Alongside the nitrogen (and acid), deposition will be calculated using deposition velocities for grassland habitats of 1.5mm/s for NO_2 and 2mm/s for NH_3, and for taller vegetation such as trees of 3mm/s for NO_2 and 30mm/s for NH_3.

Onsite Plant Emissions

11.4.36 Emissions from the onsite energy plant and industrial plant have been modelled using the Breeze AERMOD atmospheric dispersion modelling programme. At this stage the exact emission parameters from the onsite plant are not known, details on the modelling methodology, model input parameters and assumptions are summarised in **Appendix 11.3**.

11.4.37 Concentrations of NO_2 have been predicted for a range of worst-case locations of relevant human health exposure both at sensitive existing properties and within the Proposed Development itself to allow comparison with the NAQOs and (for existing receptors only) determination of the severity of impacts at each receptor. The receptors modelled are the same as identified for the operational road traffic impacts detailed assessment (see Paragraphs 11.4.30 to 11.4.35).

11.4.38 The pollutant concentrations of NO_2, SO_2 and NH_3 were also predicted at specific ecological receptor locations to calculate the Nitrogen Deposition and Acid deposition levels at the ecological sites.

11.4.39 The model assumes that emissions from the energy plant are released from the same flue. At this stage the height and location of the flues are not known and therefore the flue has been modelled at heights of 3m, 10m and 25m from the roof height of the building (35m) as set out in the parameter plans.

11.4.40 The emissions from the industrial plant is not known at this stage and therefore flues have been located across the Proposed Development to calculate a ceiling release limit for the

Proposed Development at which there is no significant air quality effect, based on flues at 10m and 25m above the height of the building.

11.4.41 The model has been run with hourly sequential meteorological data from the Yeovilton monitoring station. Data from 2018 have been used to be consistent with the traffic modelling.

11.4.42 The potential entrainment of the plume in the wake of nearby buildings (the so-called building downwash effect) has been considered in the model by including buildings within the model. The modelled buildings and dimensions are presented in **Appendix 11.3**.

Baseline Data Collection

11.4.43 Information on existing air quality has been obtained by collating the results of monitoring carried out by SDC. Background concentrations for the site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid. In addition, existing (2018 to be consistent with the traffic data used in the assessment) and future (2032) baseline concentrations of relevant pollutants have been modelled at existing receptor locations (details on the methodology is presented in Section 11.4).

Sensitive Receptors

11.4.44 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes, etc. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.

11.4.45 Based on these guidelines, seven existing properties have been identified as sensitive residential receptors for the assessment. The locations of residential receptors were chosen to represent locations where impacts from road traffic and plant related to the Proposed Development are likely to be the greatest, i.e. as a result of development traffic at junctions. These locations are presented in **Table 11.5** and shown in **Figure 11.1**. Receptors were modelled at a height of 1.5 m representing ground floor exposure.

11.4.46

Receptor	Location	Height (m)	OS Grid Reference	
			X	Y
R1	7 Woolavington Hill	1.5	334749	141459
R2	Woolavington School	1.5	334480	141522
R3	99 Woolavington Road	1.5	333529	141602
R4	97 Woolavington Road	1.5	333006	141660
R5	79 Woolavington Road	1.5	332564	141535
R6	25 Orchard Close	1.5	331628	141346
R7	Rockfield House, Puriton Hill	1.5	332097	141030
P1	Proposed Receptor 1	1.5	332752	141616
P2	Proposed Receptor 2	1.5	333626	141617
P3	Proposed Receptor 3	1.5	334184	141573

Table 11.5 Human Receptor Locations Assessed

11.4.47 There are no designated ecological sites within 200 m of a road where Project related traffic in isolation is exceeds the relevant thresholds (**Table A11.3.3**) and is not considered to be a risk of likely significant effects at ground level. There are several statutory ecological receptors within 10km of the Proposed Development. The Severn Estuary SAC and SPA are located approximately 2.9km west of the Site. The Somerset Moors and Levels SPA is located approximately 3.5km east of the Site. The Huntspill National Nature Reserve is adjacent to the north of the Site. These locations are described in **Appendix 11.4** and shown in **Figure 11.2**.

Assessment of Significance

Construction Phase

11.4.48 The IAQM guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations.

11.4.49 With appropriate mitigation in place, the IAQM guidance indicates that the residual effect dust emissions associated with the demolition and construction can be classified as being 'not significant'.

Operational Phase

Human Receptors

11.4.50 The relevant NAQOs are set out in **Table 11.1** and **Table 11.2**. The predicted pollutant concentrations in the future year (2032) at each identified sensitive receptor have been compared to the relevant NAQOs and any exceedances identified.

11.4.51 Analysis of long-term monitoring data suggests that if the annual mean NO_2 concentration is less than 60 µg/m^3 then the 1-hour mean NO_2 NAQO is unlikely to be exceeded where road

transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the one-hour mean objective is likely to be achieved (DEFRA, 2018a). Analysis of long-term monitoring data also suggests that if the annual mean PM_{10} concentration is less than 32 µg/m^3 then the 24-hour mean PM_{10} NAQO is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the 24-hour mean NAQO is likely to be achieved.

11.4.52 There is no official guidance in the UK on how to assess the significance of the air quality impacts of existing air quality on a new development. The assessment of proposed receptors within the Site has therefore been limited to predicting pollutant concentrations at worst-case receptors within the Site and comparing these predicted concentrations to the relevant NAQOs, with the overall significance being based on whether the NAQOs for each pollutant are exceeded or not.

11.4.53 There is no official guidance in the UK on how to assess the significance of the air quality impacts of a new development on existing receptors. The approach developed by EPUK and the IAQM (EPUK / IAQM, 2017), which considers the change in air quality as a result of a Proposed Development on existing receptors in combination with baseline concentrations at the receptors, has therefore been used. The guidance sets out three stages: determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance. Impact magnitude relates to the change in pollutant concentration; the impact description relates this change to the air quality objective and is shown in **Table 11.6**.

Long term average Concentration at receptor in assessment year	% Changes in Concentration with development in relation to NAQO / Limit Value			
	1*	2-5	6-10	>10
> 110 % [a]	Moderate	Substantial	Substantial	Substantial
>102% - ≤110% [b]	Moderate	Moderate	Substantial	Substantial
>95% - ≤102% [c]	Minor	Moderate	Moderate	Substantial
>75% - ≤95% [d]	Negligible	Minor	Moderate	Moderate
≤75% [e]	Negligible	Negligible	Minor	Moderate

Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.
% change rounded to nearest whole number. Where the % change is 0 (i.e. Less than 0.5%) the impact will be Negligible.
To align with the terminology used in the ES the term 'slight' used by the IAQM has been changed to 'minor'
[a] NO_2 or PM_{10}: > 44 µg/m^3 annual mean; $PM_{2.5}$ >27.5 µg/m^3 annual mean; PM_{10} >35.2 µg/m^3 annual mean (days).
[b] NO_2 or PM_{10}: > 40.8 – ≤ 44 µg/m^3 annual mean; $PM_{2.5}$ > 20.4 – ≤22 µg/m^3 annual mean; PM_{10} >32.64 – ≤35.2 µg/m^3 annual mean (days).
[c] NO_2 or PM_{10}: > 38 – ≤40.8 µg/m^3 annual mean; $PM_{2.5}$ >19 – ≤20.4µg/m^3 of annual mean; PM_{10} >30.4 – ≤32.64 µg/m^3 annual mean (days).
[d] NO_2 or PM_{10}: >30 - ≤38 µg/m^3 annual mean; $PM_{2.5}$ >15 - ≤19 µg/m^3 annual mean; or <24 - ≤ 30.4 µg/m^3 annual mean (days).

[e] NO_2 or PM_{10}: ≤30 µg/m^3 annual mean; $PM_{2.5}$ ≤15 µg/m^3 annual mean; PM_{10} ≤24 µg/m^3 annual mean (days).

Table 11.6 Impact Significance Criteria

11.4.54 The guidance states that the overall assessment of significance should be based on professional judgement, taking into account factors including:

- the number of properties affected by 'Slight', 'Moderate' or 'Substantial' adverse air quality impacts and a judgement on the overall balance;

- the magnitude of the changes and the descriptions of the impacts at the receptors;
- whether or not an exceedance of an NAQO or limit value is predicted to arise in the operational study area (where there are significant changes in traffic) where none existed before or an exceedance area is substantially increased;
- the uncertainty, comprising the extent to which worst-case assumptions have been made; and
- the extent to which an NAQO or limit value is exceeded.

11.4.55 Therefore, where impacts at an individual receptor are classified as 'Negligible' or 'Slight', effects would typically be considered 'not significant'. However, where 'Moderate' or 'Substantial' adverse impacts are identified at individual receptors, the overall effect needs to be considered in the round taking into account the changes at all of the modelled receptor locations, with a judgement made as to whether the overall air quality effect of the development is 'significant' or not.

Ecological Receptors

11.4.56 In terms of the impact of road traffic emissions on ecological receptors, an impact of less than 1% of the critical level or load is accepted to be a pragmatic threshold for determining no likely significant effects (Natural England, 2018). It should be noted that an impact of more than 1% is not, per se, an indication that a significant effect exists, only the possibility of one which would trigger the need for further, more detailed assessment of the ecological sensitivity and value of the habitat.

11.4.57 Where the predicted impact exceeds 1%, consideration needs to be given to the overall critical level or load. Where the critical level or load is exceeded, input is required from the Project's ecological consultants to ascertain the potential significant of the impact and resultant effects.

11.4.58 The Environment Agency's Operational Instruction 66_12 (Environment Agency, 2012) details how the air quality impacts on ecological sites should be assessed. This guidance provides risk-based screening criteria to determine whether impacts will have 'no likely significant effects (alone and in-combination)' for European sites, and 'no likely damage' for SSSIs. These criteria are as follows:

- Process contribution (PC) does not exceed 1% long-term critical level or load or that the PEC does not exceed 70% long-term critical level and/or critical load for European sites and SSSIs; and
- PC does not exceed 10% short-term critical level for NOx for European sites and SSSIs;

11.4.59 Where impacts cannot be classified as resulting in 'no likely significant effect', more detailed assessment may be required depending on the sensitivity of the feature in accordance with EAs Operational Instruction 67_12 ('Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation'). This can require the consideration of the potential for in-combination effects, the actual distribution of sensitive features within the site, and local factors (such as the water table).

11.4.60 The guidance provides the following further criteria:

- if the predicted environmental concentration (PEC) does not exceed 100% of the appropriate limit it can be assumed there will be no adverse effect;
- if the background is below the limit, but a small PC leads to an exceedance - decision based on local considerations;

- if the background is currently above the limit and the additional PC will cause a small increase - decision based on local considerations;
- if the background is below the limit, but a significant PC leads to an exceedance - cannot conclude no adverse effect; and
- if the background is currently above the limit and the additional PC is large - cannot conclude no adverse effect.

Limitations

11.4.61 There are many components that contribute to the uncertainty in predicted concentrations. The models used in this assessment are dependent upon the traffic and plant data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

11.4.62 There has been an acknowledged disparity between national road transport emissions projections and measured annual mean concentrations of nitrogen oxides (NOx) and NO_2 for many years. Recent monitoring has shown that reductions in concentrations are now being measured in many parts of the country (Air Quality Consultants Ltd., 2020), however, there is still some uncertainty regarding the rate at which emissions will reduce in the future and therefore some consideration must be given to the accuracy of any projection and to appropriately respond to this.

11.4.63 Baseline traffic data was collected by the transport consultant, Stantec, in 2018 prior to the COVID-19 pandemic . 2018 flows have been used to inform the baseline air quality assessment as restrictions on movement implemented by the Government in response to the Covid-19 pandemic placed limitations on collecting more recent data.

11.4.64 The complete development modelling has been based on 2030 emission factors and background concentrations, whilst utilising traffic flows for 2032. The model has been verified against 2018 monitoring data to be consistent. This is considered to provide an appropriately conservative assessment considering the uncertainties regarding future vehicle emission factors.

11.4.65 The assessment has been undertaken assuming that there will be no reduction in baseline deposition in the future, as this is not accounted for within the APIS website predictions. Reductions in baseline deposition are likely to occur because of improvements in background pollutant concentrations in the future, partly from reductions in vehicle emissions.

11.5 Baseline Conditions

Current State of the Environment

EU Limit Values

11.5.1 The study area does not contain any predicted or measured exceedances of an EU Limit Values either in the current year (2018) or in the future year (2032). The study area is not within a zone where DEFRA have reported an exceedance of an EU Limit Values either in the ‘existing’ baseline year (2018) or in future years.

LAQM

11.5.2 SDC has investigated air quality within its area as part of its responsibilities under the LAQM regime. To date, no AQMAs have been declared because of exceedances of the NAQOs.

Local Monitoring Data

NO_2

11.5.3 The Council deployed NO_2 diffusion tubes at 32 locations in 2019, including one location within the study area. 2015-2019 monitoring results for the most representative and closest monitoring location to the Site are shown in **Table 11.7**.

Site ID	Site Type	Within AQMA	Annual Mean (µg/m³)				
			2015	2016	2017	2018	2019
DT33 Bristol Road, Dunball	Roadside	N	34.6	33.6	34.3	32.4	29.4
NAQO			**40**				

2015 – 2019 data taken from the SDC 2020 Air Quality Annual Status Report (SDC, 2020).

Table 11.7 Measured Annual Mean NO_2 Concentrations 2015 – 2019

11.5.4 Measured concentrations at the Bristol Road, Dunball monitor have been well below the annual mean objective between 2015 and 2019.

PM_{10} and $PM_{2.5}$

11.5.5 SDC carries out PM_{10} and $PM_{2.5}$ monitoring at four automatic monitoring stations, the nearest of which is located 4 km from the Proposed Development, given the distance to the Proposed Development it is not considered to be representative of concentrations at the Site.

Estimated Background Concentrations

11.5.6 Estimated background concentrations for the Site have been obtained from the latest 2018-based national maps provided by Defra (Defra, 2020b). The Defra background concentrations for the study area are provided in **Table 11.8.** The background concentrations are all well below the relevant NAQOs both in the 'existing' and future years.

Year	Location	Annual Mean (µg/m³)		
		NO_2	PM_{10}	$PM_{2.5}$
2018	331_140[a]	14.4	14.0	8.8
	334_141	7.1	11.8	7.6
	333_141	6.9	11.1	7.3
	332_141	8.8	11.9	7.8
	331_141	15.2	14.4	8.9
2030	334_141	4.9	10.7	6.7
	333_141	4.6	10.1	6.4
	332_141	5.5	10.9	6.9
	331_141	8.2	13.3	7.9
NAQOs		**40**	**40**	**20**

[a] Location of monitoring site used for verification.
Note: Projections in the 2018 reference year background maps and associated tools are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these tools do not reflect short- or longer-term impacts on emissions in 2020 and beyond resulting from behavioural change during the national or local lockdowns.

Table 11.8 Estimated Annual Mean Background Concentrations

Baseline Deposition – Ecological Receptors

11.5.7 The three-year average (2017 - 2019) nitrogen and acid deposition rates for each of the ecological receptors with habitats that are sensitive to either nitrogen or acid deposition are presented in **Table 11.9** data have been taken from the APIS website (APIS, 2020). The APIS data does not include future year predictions and therefore on a conservative basis, the APIS baseline is assumed constant for the future year assessments.

Receptor	Total Nitrogen Deposition (kgN/ha/yr)	Acid Deposition		Ammonia (µg/m³)
		Nitrogen (keqN/ha/yr)	Sulphur (keqS/ha/yr)	
Severn Estuary SAC (E1, E4)	19.34	Not sensitive		2.94
Severn Estuary SAC (E2, E3, E5)	13.96			1.89
Severn Estuary SAC (E6-E11)	**21.93**			**3.5**
Critical Load/Level	**20**			**3**
Severn Estuary SPA (E27)	19.34	Not sensitive		2.94
Severn Estuary SPA (E28-29)	13.96			1.89
Severn Estuary SPA (E30-32)	**21.93**			**3.5**
Critical Load/Level	**20**			**3**
Somerset Levels and Moors SPA (E12-E19	**20.97**	**1.498**	0.119	**3.21**
Critical Load/Level	**20**	0.5493	0.1833	**3**
Somerset Levels and Moors SPA (E20-E24)	**20.15**	1.439	0.118	2.97
Critical Load/Level	**20**	4.446	4.08	**3**
Somerset Levels and Moors SPA (E25-E26)	19.82	**1.416**	0.112	**3.03**
Critical Load/Level	**20**	1.053	0.83	**3**

Exceedances of the critical level/critical load are highlighted in bold.

Table 11.9 Baseline Deposition Rates

Predicted Baseline Concentrations – Human Receptors

11.5.8 The ADMS-Roads model has been used to predict baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations at each of the existing receptor locations identified. The results for the 2018 (i.e. the current state of the environment) are presented in **Table 11.10**.

Receptor	NO_2	PM_{10}	$PM_{2.5}$
R1	14.1	13.0	8.3
R2	9.3	12.1	7.8
R3	10.8	11.7	7.6
R4	11.2	11.8	7.6
R5	14.0	12.7	8.2
R6	**47.5**	18.8	11.6
R7	23.8	14.6	9.4
NAQOs	**40**	**40**	**20**

Exceedances of the NAQOs are highlighted in bold.

Table 11.10 Predicted Baseline Annual Mean Concentrations (µg/m³) of NO_2, PM_{10} and $PM_{2.5}$ in 2018

11.5.9 Predicted concentrations of NO_2 exceed the relevant NAQO at one existing receptor (R6) in 2018. PM_{10} predicted concentrations are well below the relevant NAQOs at all existing receptors.

11.5.10 None of the predicted annual mean NO_2 concentrations exceed 60 µg/m^3 and therefore exceedance of the 1-hour mean NO_2 NAQO is unlikely.

11.5.11 None of the predicted annual mean PM_{10} concentrations exceed 32 µg/m^3 and therefore the 24-hour mean PM_{10} NAQO is not predicted to be exceeded.

2032 Baseline

11.5.12 The ADMS-Roads model has been used to predict baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations at each of the existing receptor locations identified. The results for the 2032 baseline scenario are presented in **Table 11.11**.

Receptor	NO_2	PM_{10}	$PM_{2.5}$
R1	7.8	12.3	7.6
R2	6.0	11.3	7.0
R3	6.5	11.1	7.0
R4	6.9	11.2	7.1
R5	7.6	11.9	7.5
R6	21.3	18.9	11.1
R7	10.3	13.5	8.4
NAQOs	**40**	**40**	**20**

Table 11.11 Predicted Baseline Annual Mean Concentrations (µg/m^3) of NO_2, PM_{10} and $PM_{2.5}$ in 2032

11.5.13 The annual mean NO_2, PM_{10} and $PM_{2.5}$ NAQOs are not predicted to be exceeded at any of the existing receptor locations in 2032. Furthermore, predicted concentrations of NO_2 are lower than 60 µg/m^3 indicating that it is unlikely that any exceedances of the 1-hour mean NAQO have occurred, and predicted concentrations of PM_{10} are lower than 32 µg/m^3 indicating that it is unlikely that any exceedances of the 24-hour mean NAQO have occurred.

11.5.14 Overall, baseline concentrations of the pollutants considered are predicted to decrease between 2018 and 2032 as vehicle emission factors and background concentrations are assumed to improve, despite the traffic increase on the network.

11.6 Embedded Mitigation

Construction Phase

11.6.1 A Framework Demolition and Construction Environmental Management Plan (FDCEMP) which will manage the construction traffic effects as well as potential construction dust, will be submitted with the ES. The following mitigation measures, with regard to high risk sites, from the IAQM guidance (IAQM, 2014) are recommended. The FDCEMP is secured within the Compliance Form.

Communication

- Develop and implement a stakeholder communications plan.
- Display the name and contact details of persons accountable on the Site boundary.
- Display the head or regional office information on the Site boundary.

Management

- Develop and implement a dust management plan.
- Record all dust and air quality complaints, identify causes and take measures to reduce emissions.
- Record exceptional incidents and action taken to resolve the situation.
- Carry out regular site inspections to monitor compliance with the dust management plan and record results.
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken.
- Agree dust monitoring locations with the local authority and instigate monitoring 3 months in advance of works commencing in the area.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary at least as high as any stockpile on site.
- Fully enclose Site or specific operations where there is a high potential for dust production and the Site is active for an extensive period.
- Avoid site run off of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove potentially dusty materials from Site as soon as possible.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary.
- Avoid the use of diesel or petrol powered generators where possible.
- Produce a Construction Logistics Plan to manage the delivery of goods and materials.
- Only use cutting, grinding and sawing equipment with dust suppression equipment.
- Ensure an adequate supply of water on-site for dust suppressant.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate.

- Ensure equipment is readily available on-site to clean up spillages of dry materials.
- No on-site bonfires and burning of waste materials on-site.

Demolition

- Incorporate soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure water suppression is used during demolition operation.
- Avoid explosive blasting, using appropriate manual and mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Earthworks

- Re-vegetate earthworks and exposed areas /soil stockpiles to stabilise surfaces as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored silos with suitable emissions control systems.
- Crushers shall be totally contained or fitted with a water suppression system.

Trackout

- Use water assisted dust sweepers on the Site access and local roads.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving the Site are covered to prevent escape of materials.
- Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable.
- Install hard surfaced haul routes which are regularly damped down.
- Install a wheel wash with a hard-surfaced road to the Site exit where site layout permits.
- The Site access gate to be located at least 10m from receptors where possible.
- To utilise the Gravity link road for construction traffic to avoid impacts in adjacent villages and if appropriate to use the existing secondary access on the eastern boundary for construction when appropriate, to reduce movements in Woolavington.

Operational Phase

11.6.2 The completion of the Gravity Link Road and associated highway works and the Village Enhancement Scheme will provide a new direct link into the Proposed Development from the

A39 Puriton Hill and M5 Junction 23 bypassing local villages and reducing the impact on air quality. The use of existing secondary access on the eastern boundary is also proposed if this helps to reduce movements in Woolavington.

11.6.3 A site wide Framework Travel Plan (as detailed in **Chapter 9:** Access and Transport) will be implemented to actively monitor and manage the operational transport effects with the aim of increasing the number of journeys made by sustainable modes of transport.

11.6.4 Effective mitigation options for the proposed energy and industrial plant (such as low-NOx burners, abatement and appropriate stack height and would be set out in the Design Code) are typically required by other regulatory regimes and therefore considered to be embedded within the design of the Proposed Development.

11.7 Assessment of Likely Effects

Construction Phase Dust Emissions

Screening Assessment

11.7.1 There are a number of existing sensitive human receptors (residential properties) located within 350 m of the Site boundary and within 50 m of the routes that will be used by demolition and construction vehicles. As such, further assessment of the risk of dust soiling and PM_{10} emissions is required.

11.7.2 The Huntspill River National Nature Reserve (NNR) is located within 250 m of the Site boundary and there are ten Local Wildlife Sites (LWS) located within or adjacent to the Site: Puriton Rhynes and Ponds; Borrow Pit, Stoning Pound Field and Rhyne, Woolavington Road and Fields North, Puriton Cowslip Field, Puriton Ash Ground, Northmead Drove Fields, Puriton Meadows and Rail Spur, New Ground Covert, South Hills Wood . As such, further assessment of the ecological impacts because of dust soiling is required.

Further Assessment

Dust Emission Magnitude

11.7.3 The dust emissions magnitude of demolition, earthworks and construction activities and as a result of trackout have been determined based the criteria shown in **Appendix 11.2.**

11.7.4 Most of the demolition of the former ROF Site has been undertaken. However, there are a limited number of buildings remaining that will require to be demolished to accommodate the LDO. Based on this, the dust emission magnitude of demolition activities is judged to be 'medium'.

11.7.5 The Site is approximately 264.54 hectares (2,615,400 m^2) in area and soil at the Site is moderately dusty. Based on this, the dust emission magnitude of earthworks activities is judged to be 'large'.

11.7.6 Construction activities comprise the construction of a range of buildings on the Site, with a total building volume of more than 100,000 m^2. Based on this, and despite phasing of construction, the dust emission magnitude of construction activities is judged to be 'large'.

11.7.7 The number of HDVs that will exit the Site daily during the peak construction phase is estimated to be 27 per day. Based on this, the dust emission magnitude of trackout is judged to be 'medium'.

Area Sensitivity

11.7.8 The area sensitivity to dust soiling and human health impacts has been determined based on the criteria shown in **Appendix 11.2.**

11.7.9 Residential properties are classed as being 'high sensitivity' receptors to dust soiling, based on the IAQM guidance (IAQM, 2014) (see **Table A11.2.2**, **Appendix 11.2**). There are approximately 20 residential properties located within 20 m of the Site boundary; in addition there will temporary construction housing within the Site boundary as such, the sensitivity of the area surrounding the Site to dust soiling (**Table A11.2.3**) is judged to be 'high'.

11.7.10 The IAQM guidance states that trackout may occur for distance of up to 500 m from large sites. As the demolition and construction traffic routing is currently unknown, the worst-case assumption has been made that all main roads may potentially be used by HDVs leaving the Site entrance(s). There are between 10 and 100 residential properties located within 20 m of roads extending up to 500 m of the Site; as such, the sensitivity to dust soiling of the area surrounding roads along which material may be tracked is judged to be 'high'.

11.7.11 The IAQM also defines residential properties as being 'high sensitivity' receptors to human health impacts (see **Table A11.2.2**, **Appendix 11.2**). PM_{10} concentrations at existing residential properties within the study area will be similar to the maximum of the predicted 2018 PM_{10} concentrations at Receptor 6 (i.e. 18.8 $\mu g/m^3$). Based on the predicted existing PM_{10} concentrations and the number of sensitive receptors within 20 m of the Site boundary and roads along which material may be tracked, the sensitivity to human health impacts of the areas surrounding the Site and the area surrounding roads along which material may be tracked (**Table A11.2.4**) are judged to be 'medium'.

11.7.12 NNRs with dust sensitive features are classed as being 'high sensitivity' receptors to dust deposition, based on the IAQM guidance (IAQM, 2014) (see **Table A11.2.2**, **Appendix 11.2**). There is one NNR (Huntspill River) located adjacent to the Site boundary; as such, the sensitivity of the area surrounding the Site to dust soiling (**Table A11.2.5**) is judged to be 'high'.

Risk of Impacts

11.7.13 The risk of construction dust impacts, without mitigation, have been defined based on the criteria shown in **Appendix 11.2** and are presented in **Table 11.12**.

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	High	High	Medium
Human Health	Medium	Medium	Medium	Medium
Ecology	Medium	High	High	Medium

Table 11.12 Risk of Construction Dust Impacts

11.7.14 Overall therefore, based on **Table 11.12**, appropriate mitigation measures corresponding to a 'high risk' site are required during the construction phase of the Proposed Development (as detailed in **paragraph 11.6.1**).

Construction Traffic

11.7.15 During the construction period, the increase in heavy duty vehicles (HDVs) movements on the road network will be below the threshold of 100 movements per day outside an Air Quality Management Area (AQMA) for an assessment to be necessary according to Environmental Protection UK (EPUK) and IAQM guidance. The maximum increase in HDV movements is 54

per day, the construction traffic impacts on human health receptors in the area are likely to be insignificant and have therefore been scoped out of this assessment.

Site Suitability

11.7.16 Predicted concentrations at modelled receptor locations are presented in **Table 11.13**.

Receptor	NOx	PM10	PM2.5
P1	10.0	12.0	7.5
P2	11.4	11.1	7.0
P3	9.0	11.4	7.1
Objectives	**40**	**40**	**20**

Table 11.13 Predicted Concentrations of NO_2, PM_{10} and $PM_{2.5}$ (µg/m³) at On-Site Receptors in 2032

11.7.17 Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are well below the relevant NAQOs at all worst-case receptors, therefore, air quality within the Proposed Development, without mitigation, will be acceptable.

Operational Phase Road Traffic

11.7.18 Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at existing receptors, both without and with the Proposed Development in place, are presented in **Table 11.14**, **Table 11.15** and **Table 11.16**. The 'without development' scenario predicted concentrations include background concentrations and emissions from existing traffic, and the 'with development' scenario predicted concentrations include background concentrations, emissions from existing traffic and traffic generated by the Proposed Development.

Receptor	2032 Without Development	2032 With Development	Change (as % of NAQO)	Impact Descriptor
R1	7.8	7.8	0%	Negligible
R2	6.0	6.0	0%	Negligible
R3	6.5	6.5	0%	Negligible
R4	6.9	6.9	0%	Negligible
R5	7.6	7.6	0%	Negligible
R6	21.3	21.5	1%	Negligible
R7	10.3	10.3	0%	Negligible
Objectives	**40**		-	

Table 11.14 Predicted Concentrations of NO_2 (µg/m³), % Change and Impact at each Receptor

Receptor	2032 Without Development	2032 With Development	Change (as % of NAQO)	Impact Descriptor
R1	12.3	12.4	0%	Negligible
R2	11.3	11.3	0%	Negligible
R3	11.1	11.1	0%	Negligible
R4	11.2	11.2	0%	Negligible
R5	11.9	11.9	0%	Negligible
R6	18.9	19.0	0%	Negligible
R7	13.5	13.5	0%	Negligible
Objectives	**40**		-	

Table 11.15 Predicted Concentrations of PM_{10} (µg/m³), % Change and Impact at each Receptor

Receptor	2032 Without Development	2032 With Development	Change (as % of NAQO)	Impact Descriptor
R1	7.6	7.6	0%	Negligible
R2	7.0	7.0	0%	Negligible
R3	7.0	7.0	0%	Negligible
R4	7.1	7.1	0%	Negligible
R5	7.5	7.5	0%	Negligible
R6	11.1	11.2	0%	Negligible
R7	8.4	8.4	0%	Negligible
Objectives	**20**		-	

Table 11.16 Predicted Concentrations of $PM_{2.5}$ (µg/m³), % Change and Impact at each Receptor

11.7.19 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations in 2032, both without and with the Proposed Development in place, are below the relevant NAQOs at all existing receptors. Furthermore, predicted annual mean NO_2 concentrations are below 60µg/m³ at all receptors, indicating that exceedances of the 1-hour mean NO_2 NAQO are not likely, and the predicted annual mean PM_{10} concentrations are below 32 µg/m³ at all receptors, indicating that exceedances of the 24-hour mean PM_{10} NAQO are not likely.

11.7.20 The changes in annual mean NO_2 concentrations (when rounded to the nearest whole number) range from 0% at six receptors and 1% at one receptor; using the criteria set out in **Table 11.6**, these impacts are described as being 'Negligible' at all receptors.

11.7.21 The changes in annual mean PM_{10} and $PM_{2.5}$ concentrations (when rounded to the nearest whole number) are 0% at all receptors; using the criteria set out in **Table 11.6**, the PM_{10} and $PM_{2.5}$ impacts are described as being 'Negligible' at all receptors.

Operational Phase Plant Emissions

Energy Plant

11.7.22 The maximum predicted PCs at the sensitive receptor locations for the energy plant are presented in **Table 11.17** based on an NOx emission ceiling rate of 5g/s and an SO_2 ceiling rate of 2g/s, to avoid adverse air quality effects. Results of the other emissions rates and stack heights are presented in **Appendix 11.6**.

Receptor	3m		10m		25m	
	PC	%PC	PC	%PC	PC	%PC
Human Health						
Maximum NO_2	1.2	3	1.2	3	1.0	3
Ecological Receptors						
Maximum NOx	1.2	4	1.1	4	1.0	3
Maximum SO_2	0.48	2	0.45	2	0.39	2
Maximum Nitrogen Deposition	0.04	0	0.03	0	0.03	0
Maximum Acid Deposition	0.015	4.1	0.014	3.8	0.013	3.4

Table 11.17 Maximum Energy Plant Concentrations

11.7.23 Based on the maximum concentrations presented in Table 11.14 the impact of the energy plant assuming a NOx emission ceiling of 5g/s is not significant. As presented **in Appendix**

11.6 higher emission rates are likely to be acceptable but will need to be considered through the Design Guide.

Industrial Plant

11.7.24 The maximum predicted PCs at the sensitive receptor locations for the industrial plant are presented in **Table 11.18** based on emission ceiling rates (to avoid adverse air quality effects) for NOx of 10g/s, for SO_2 of 5g/s, for NH_3 of 0.65g/s, for PM_{10} of 5g/s, $PM_{2.5}$ of 2g/s. Results for other emissions rates are presented in **Appendix 11.6**.

Receptor	10m		25m	
	PC	%PC	PC	%PC
Human Health				
Maximum NO_2	2.65	6.6	2.39	6.0
Maximum PM_{10}	1.89	4.7	1.71	4.3
Maximum $PM_{2.5}$	0.76	3.8	0.68	3.4
Maximum Benzene	0.38	7.6	0.34	6.8
Ecological receptors				
Maximum NOx	2.07	6.9	1.81	6.0
Maximum SO_2	0.34	1.7	0.29	1.4
Maximum NH_3	0.045	1	0.037	1
Maximum Nitrogen Deposition	0.3	1.5	0.3	1.3
Maximum Acid Deposition	0.049	13.4	0.042	11.5

Table 11.18 Maximum Industrial Plant Concentrations

11.7.25 Based on the maximum concentrations presented in **Table 11.18** the impact of the industrial plant assuming a NOx emission ceiling of 10g/s is not significant. As presented in **Appendix 11.6** higher emission rates are likely to be acceptable but will need to be considered through the Design Guide.

Ecological Effects

11.7.26 Full results for the ecological assessment are provided in **Appendix 11.6**.

11.7.27 The NO_x critical level is predicted to be met at Severn Estuary SAC with the Proposed Development. The nitrogen deposition critical load with the development in place is predicted to be met at five receptor locations and exceeded at six receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations. The increase in nitrogen deposition is below the 1% threshold at all receptor locations. The NH_3 critical level is predicted to be met at Severn Estuary SAC with the Proposed Development, at five receptor locations and exceeded at six receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations the increase in concentration is below the 1% threshold at all receptor locations.

11.7.28 The NOx critical level is not predicted to be exceeded at the Severn Estuary SPA with the Proposed Development. The nitrogen deposition critical load with the development in place is predicted to be met at three receptor locations and exceeded at three receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations. The increase in nitrogen deposition is below the 1% threshold at all receptor locations. The NH_3 critical level is predicted to be met at Severn Estuary SPA with the Proposed Development, at three receptor locations and exceeded at three receptor locations, this is due to the baseline deposition rate exceeding the critical load at these locations the increase in concentration is below the 1% threshold at all receptor locations.

11.7.29 The NOx critical level is not predicted to be exceeded at the Somerset Levels & Moors SPA with the Proposed Development. The nitrogen deposition critical load with the development in place is predicted to be met at three receptor locations and exceeded at thirteen receptor locations within the Somerset Levels & Moors SPA, this is due to the baseline deposition rate exceeding the critical load at these locations. The increase in nitrogen deposition is below the 1% threshold at all receptor locations.

11.7.30 The increase in acid deposition is below the 1% threshold for significance at seven receptor locations and above the 1% threshold for significance at eight receptor locations. The NH_3 critical level is predicted to be exceeded at the Somerset Levels & Moors SPA with the

locations, this is due to the baseline rate exceeding the critical load, the increase in concentration is below the 1% threshold at all receptors.

11.7.31 The NOx critical level is not predicted to be exceeded at the Huntspill NNR with the Proposed Development.

11.7.32 Given the magnitude of the predicted increases in concentration and deposition rates the impact of the Proposed Development on the ecological sites can be screened out as not significant.

11.8 Further Mitigation

Construction

11.8.1 No further mitigation measures are required.

Operation

11.8.2 No further mitigation measures are required.

11.9 Residual Effects

Construction

11.9.1 With appropriate mitigation in place the construction phase residual effects are negligible.

Operation

11.9.2 The operational phase residual effects are negligible.

11.10 Monitoring

11.10.1 No significant residual adverse air quality effects are identified and therefore monitoring is not proposed for the operation of the Development. During the construction phase dust monitoring is proposed as part of the embedded mitigation.

11.11 Summary

11.11.1 The air quality effects associated with the construction and operation of the Proposed Development have been assessed.

11.11.2 The construction works have the potential to create dust. During construction a package of mitigation measures will be put in place through the FDCEMP to minimise the risk of elevated PM_{10} concentrations and dust nuisance in the surrounding area. With mitigation in place the construction impacts are judged as being not significant.

11.11.3 Baseline concentrations of NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) have been predicted at sensitive receptor locations. There are predicted exceedances of the annual mean NO_2 objective in 2018 at one receptor location (R6) adjacent to the M5. Concentrations of NO_2 at all other receptors are predicted to be below the objective. Concentrations of PM_{10} and $PM_{2.5}$ are predicted to be below the relevant objectives in 2018 and 2032.

11.11.4 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted without and with the development in place. The impacts predicted at all individual receptor locations are described as negligible and the overall air quality effects of emissions generated by the development are not significant.

11.11.5 No additional mitigation is required to reduce the direct effects of the development on local air quality.

11.12 Referencing

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