11. Air Quality

Introduction

11.1 This Chapter reports the outcome of the assessment of likely significant environmental effects arising from the Proposed Scheme in relation to Air Quality.

11.2 The Chapter describes the technical consultation that has been undertaken during the EIA, the scope of the assessment and assessment methodology, and a summary of the baseline information that has informed the assessment.

11.3 In line with **Chapter 2: Approach to EIA**, the assessment reports on the likely significant environmental effects, the further mitigation measures required to prevent, reduce or offset any significant adverse effects, or further enhance beneficial effects. The conclusions are provided both in terms of the residual effects and whether these are considered significant. The assessment of effects takes into consideration both primary and tertiary mitigation (see **Chapter 2: Approach to EIA** for further details) and is informed by the EIA Scoping process (**Appendix 2.1**) and iterative scoping process where applicable.

11.4 This Chapter, and its associated **Figures 11.1 – 11.18** and **Appendices 11.1 – 11.8** is intended to be read as part of the wider ES with particular reference to the introductory Chapters of this ES (**Chapters 1 – 5**), as well as **Chapter 7: Terrestrial Ecology,** were the results of the air dispersion modelling (see '*Effects Considered Likely to be Significant*' for more details) being used to inform the evaluation of impacts on ecological receptors.

11.5 In addition, this Chapter should be read in conjunction with **Chapter 14: Assessment of Cumulative Effects**.

Summary of Consultation

11.6 **Table 11.1** provides an overview of the consultation that has been undertaken to inform the Proposed Scheme and EIA, including the consideration of likely significant effects and the methodology for assessment.

Table 11.1: Summary of Consultation

Body / Organisation	Contact	Date and Form of Consultation	Summary
Ricardo (on behalf of NPTCBC)	Technical Director	Meeting 25th May 2023 and email 25th May 2023	Response to Air Quality briefing Note 6 dated 23rd May 2023. Requested clarification on traffic screening assessment, approach to dealing with construction traffic, screening of impacts on ecological receptors and assessment against the proposed targets for $PM_{2.5}$.

Body / Organisation	Contact	Date and Form of Consultation	Summary
Ricardo (on behalf of NPTCBC)	Technical Director	Email correspondence 22nd June 2023	Confirmation that the DMRB screening thresholds of 1000 vehicles per day or 200 HGV per day is not necessarily protective of ecologically sensitive sites when screening traffic impacts individually and in-combination[a]. This approach has not therefore been used and detailed modelling of operational traffic along the M4 past the Kenfig SAC/SSSI has been undertaken.
Natural Resources Wales (NRW)	Air Quality Advisor	Email correspondence 4th July 2023	Confirmation that NRW are happy with the proposed modelling methodology to assess impacts on local designated nature conservation sites, however made the comment that '*no detailed site specific review has been undertaken at this stage, so this comment has no implication to our detailed review later on the submitted permit application. We may still require some further information if we feel necessary in the detailed review*'. Additional comment was provided in relation to in-combination assessment which stated '*an in-combination assessment will need to include all the relevant emission sources including non-point sources if appropriate*'.

Scope of the Assessment

11.7 As set out in **Chapter 2: Approach to EIA**, the scoping of the EIA and ES has utilised a combination of informal consultation with NPTCBC, culminating in a formal request for an EIA Scoping Opinion in June 2023, supported by an EIA Scoping Report (**Appendix 2.1**). At the point of submission of PAC, an EIA Scoping Opinion from NPTCBC was pending.

11.8 Although the EIA Scoping Report looked to establish the overall framework of the EIA and ES, an iterative scoping process has been adopted in order to respond to the evolving engineering design of the Proposed Scheme. In a similar manner, a number of changes have occurred to the Proposed Scheme since the preparation and submission of the EIA Scoping Report, as set out within **Chapter 1: Introduction** and **Chapter 2: Approach to EIA**. As a result, it has been necessary to review the scope of assessment proposed.

11.9 This section provides a review, validation and update, where necessary, on the scope of the assessment presented within this Chapter.

[a] The assessment of in-combination effects is considered through **Chapter 14: Assessment of Cumulative Effects**.

Effects Not Considered to be Significant

11.10 The following effects were not considered significant as part of the EIA Scoping Report (**Appendix 2.1**) and, taking account of the changes occurring to the Proposed Scheme, are considered to remain unchanged and therefore not considered further in this Chapter (with detailed justification provided within the EIA Scoping Report):

- Nuisance, disturbance and a reduction in human health as a result of dust and particulate matter emissions from construction activities and NRMM.

11.11 Following the EIA Scoping Process, the following additional effect(s) are now not considered significant and the evidence to support this determination is outlined below. The determination of the effects below which are not significant are not linked to the changes that occurred to the Proposed Scheme, rather because of on-going technical evaluation following submission of the EIA Scoping Report (**Appendix 2.1**).

Nuisance, disturbance and a reduction in human health as a result of dust and particulate matter emissions from demolition works within TCA East

11.12 As set out in **Chapter 4: Development Specification**, there is a requirement to demolish existing buildings and structures within TCA East, so that it can be utilised to facilitate the construction of the Proposed Scheme. Demolition activities will generate dust emissions during the demolition process. The nearest sensitive receptors (residential properties at West End) are located over 300m from the area of demolition (i.e. within TCA East). At such distances the perceived risk of nuisance, disturbance or reduction in human health is considered to be low, in line with IAQM guidance. Furthermore, these activities would be subject to standard best practices for the management of dust from construction sites, as informed by the Institute of Air Quality Management (IAQM) Construction Guidance (see **Chapter 4: Development Specification**). Such preventative measures are likely to include, but not limited to, fencing/hoarding around the perimeter of the Site, screening and dampening of stockpiles, use of fine sprays during demolition, soft stripping of buildings prior to demolition of main structures in conjunction with ongoing monitoring and liaison with the local community, and NPTCBC. These tertiary mitigation measures would be considered an integral part of the Proposed Scheme with these measures incorporated and secured through the Construction Environmental Management Plan (CEMP). Consequently, as concluded in the IAQM guidance at sites where appropriate mitigation measures are implemented and given the separation distance between the demolition area and nearest receptors, nuisance, disturbance and a reduction in human health as a result of dust and particulate matter emissions at the nearest receptors are considered unlikely to be significant and have been scoped out for further assessment and not considered within this Chapter.

Changes to local air quality due to fugitive on-site emissions

11.13 As part of the design development process and associated engagement with the engineering design team (undertaken post submission of the EIA Scoping Report [**Appendix 2.1**]), including a further understanding of the proposed on-site plant, equipment, processes and associated emission sources a number of diffuse and channelled point sources and fugitive emission sources have been identified. Details of these emission sources are provided in **Appendix 11.1**, including linkages with applicable plant/equipment identified in **Figure 4.8**.

11.14 All the identified fugitive emission sources are designed in line with industry guidance and best practice and therefore incorporate measures to control fugitive emissions sufficiently to

prevent emissions to air including the use of internal floating roofs on the vapour tanks, continuous monitoring of vents and seals and regular maintenance to valve and pump seals. A continuous monitoring system will be applied to the Steam Vent from the heat exchanger and where VOCs are detected these are directed straight to the flare to prevent fugitive emissions.

11.15 Confirmation has been provided by the engineering design team that the mitigation and monitoring measures that will be put in place are sufficient to prevent significant fugitive emissions to air. On this basis changes to local air quality due to fugitive emissions will not be significant and have been scoped out for further assessment and will not considered further within this Chapter.

Nuisance due to odour emissions from the Proposed Scheme

11.16 The Applicant have produced an **Odour Note**, submitted as a standalone planning report, which confirms that the intent of the plant design for the Site is to mitigate any fugitive emissions and therefore no odours are expected from the inventory of any gas or liquids on the Site. The Site will also incorporate best available techniques (BAT) including periodic monitoring of odour, review of a site specific odour management plan and the use of minimal residence times, chemical treatment, aerobic treatment, enclosure measures and end-of-pipe treatment to reduce odours from wastewater collection and treatment (details of such measures are set out within the Odour Briefing Note) and as such effects from odours will not be significant and have been scoped out for further assessment and will not considered further within this Chapter.

Effects Considered Likely to be Significant

11.17 The following effects (**Table 11.2**) were considered likely to be significant at the EIA Scoping stage, remaining unaffected by the changes to the Proposed Scheme since submission of the EIA Scoping Report, and therefore these have been assessed and reported within this Chapter (supported by **Figure 11.1** and **Figure 11.2**):

Table 11.2: Effects Considered Likely to be Significant

Likely Significant Effect	Receptors	Applicable Development Stage
Change to local air quality in terms of human health and ecology due to on-site emissions associated with heating plant (gas fired boiler) which will be used as the main source of energy on the Site[1]	Nearest sensitive human receptors (residential, educational, health facilities) located to the east, northeast, west, north, northwest and west (Please see **Figure 11.1**). Exposure of users of the Site i.e. workers Ecological Receptors – Kenfig Special Area of Conservation (SAC), Crymlyn Bog SAC and	Operation

Likely Significant Effect	Receptors	Applicable Development Stage
	Cefn Cribwr SAC (Figure 11.2). Little Warren Site of Importance for Nature Conservation (SINC), Lower River AFAN SINC, Harbourside SINC, Tai-Bach Ancient Woodland and Bryn Goytre Ancient Woodland[b].	
Change to local air quality in terms of human health and ecology due to on-site emissions associated with flare and emergency point sources (i.e. emergency diesel engines and fire water pump)[1]	Nearest sensitive human receptors (residential, educational, health facilities) located to the east, northeast, west, north, northwest and west (Please see **Figure 11.1**). Exposure of users of the Site i.e. workers. Ecological Receptors – Kenfig Special Area of Conservation (SAC), Crymlyn Bog SAC and Cefn Cribwr SAC (Figure 11.2). Little Warren Site of Importance for Nature Conservation (SINC), Lower River AFAN SINC, Harbourside SINC, Tai-Bach Ancient Woodland and Bryn Goytre Ancient Woodland.	Operation
Change to local air quality in terms of human health and ecology due to transport emissions including vehicle and shipping emissions[1]	Nearest sensitive human receptors (residential, educational, health facilities) located adjacent to Harbour Road (Please see **Figure 11.1**).	Construction/Operation

[b] Subsequent assessment has scoped out ecological receptors for this effect.

Likely Significant Effect	Receptors	Applicable Development Stage
	Ecological Receptors – Kenfig SAC (**Figure 11.3**).	

[1] when assessing impacts on human health emissions of nitrogen dioxide (NO_2), particulates (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), Volatile Organic Compounds (VOC), Benzene and Carbon Monoxide (CO) have been considered. When assessing ecological receptors emissions of oxides of nitrogen (NO_x), Ammonia (NH_3) and associated depositions rates of nitrogen and acid have been considered.

11.18 In terms of the receptors for each likely significant effect, the exact receptors of relevance for each effect are informed by specific guidance. Further details of the approach to the identification of receptors is set out in *'Assessment Process'* for each effect.

Assessment Methodology

Legislative Framework, Policy and Guidance

11.19 The following legislation and policy have informed the assessment of effects within this Chapter and are detailed further in **Appendix 11.2**:

- EU Directive 2008/50/EC of the European Parliament and of the Council; of 21 May 2008 on ambient air quality and cleaner air for Europe[1];
- Air Quality Standards (Wales) Regulations – Statutory Instrument 2010 No.1001[2];
- The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019[3]
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – July 2007[4];
- Welsh Government Local Air Quality Management In Wales Policy Guidance (PG(W)(17)[5];
- Defra Local Air Quality Management Technical Guidance 2022 (LAQM.TG(22))[6];
- EU Directive 2015/2193/EU Medium Combustion Plant[7];
- The Environmental Permitting (England and Wales) (Amendment) Regulations 2018[8];
- The Environmental Permitting (England and Wales) Regulations 2016[9]
- EU Directive 2010/75/EU Industrial Emissions Directive (IED)[10];
- HM Government Environmental Permitting (England and Wales) (Amended) Regulations[11];
- Welsh Government Well-being of Future Generations (Wales) Act 2015[12];

- Welsh Government Tackling Roadside Nitrogen Dioxide Concentrations in Wales 2018[13];
- Welsh Government The Clean Air Plan for Wales: Healthy Air, Healthy Wales 2020[14];
- HM Government The Conservation of Habitats and Species Regulations 2017[15];
- EU Directive 92/43/EEC Conservation of Natural Habitats and of Wild Flora and Forna[16];
- EU Directive 2009/147/EC Conservation of Wild Birds[17];
- HM Government Wildlife and Countryside Act[18];
- HM Government Countryside and Rights of Way Act[19];
- Welsh Government Planning Policy Wales[20];
- Welsh Government Planning Policy Wales Technical Advice Note[21];
- Defra The Clean Air Strategy[22];
- HM Government The Environmental Improvement Plan[23];
- NPTCBC Local Development Plan (2011-2026)[24]; and
- NPTCBC Pollution Supplementary Planning Guidance (SPG)[25].

11.20 The following guidance has informed the assessment of effects within this Chapter and is detailed further in **Appendix 11.2**:

- European Nature Information System (EUNIS)[26];
- Air Pollution Information System (APIS)[27];
- Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) Land-use Planning & Development Control: Planning for Air Quality 2017[28];
- IAQM Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites[29]; and
- AQTAG06 Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air[30].

Defining the Study Area

On-Site Emissions (Operation Stage)

11.21 The study area incorporates human receptors located in the vicinity of the Site taking account of populated areas within Port Talbot to the north-west, north, north-east, west and south-west. The study area remains the same as that identified within the EIA Scoping Report (**Appendix 2.1**) but has been further refined based on a better understanding of the surrounding area and the Proposed Scheme (set out in **Chapter 4: Development**

Specification). The study area has been defined based on operational effects rather than construction dust effects as these have been scoped out of the assessment (see '*Scope of Assessment*' for more details).

11.22 Receptors have been selected to represent worst-case exposure to emissions from the Proposed Scheme and therefore represent potential effects at all sensitive human receptors in the area. The receptors considered within the study area are shown in **Figure 11.1**. The nearest receptors that may be affected by on-Site operational emissions are residential properties located on Lower West End, approximately 470m to the north-west of the Site from the north-eastern corner of the PDZ, (R20 and R21) and the YMCA and Sea Cadets facilities approximately 245 m to the north-west, from the north-western corner of the PDZ (R1 and R2).

11.23 The study area also includes nationally and locally designated ecological sites (Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Local Nature Reserves (LNR), Sites of Importance for Nature Conservation (SINCS), Local Wildlife Sites (WLS) and Ancient Woodland (AW)) located within 2km of the Site and internationally designated ecological sties (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) within 10 km of the Site.

11.24 Based on information provided on the DEFRA MAGIC website[31], there are no SSSI/NNR located within 2km of the Site, however additional information provided by the project ecologist has identified four SINCs and two ancient woodlands within 2km of the Site. In addition, three SACs have been identified within 10km of the Site (**Figure 11.2**)**.** The study area therefore includes the following ecological receptors:

- Little Warren SINC – 1.2km north-west of the Site;
- Lower River AFAN SINC – 0.5km north-west of the Site;
- Harbourside SINC – 0.6km north of the Site;
- Watercourses SINC – area to the south of the Site;
- Tai-Bach Ancient Woodland – 0.9km east of the Site;
- Bryn Goytre Ancient Woodland – 1.4km north-east of Site;
- Kenfig SAC (and overlapping SSSI) approximately 5km to the south of the Site;
- Cefn Cribwr SAC (and overlapping SSSI), 9.5km to the south-west of the Site; and
- Crymlyn Bog SAC (and overlapping SSSI), 7.2km to the north-west.

Traffic Emissions

11.25 The appropriate study area, and therefore identified sensitive receptors requiring assessment, has been informed by screening (in line with IAQM Guidance) of the expected construction and operational traffic generated (and inclusive of in-combination developments) across the local road network (with further details provided within the **Transport Assessment**) against thresholds set out by IAQM Guidance. A summary of this screening is provided in **Appendix 11.5, Table 11.5.2**.

11.26 The screening process (in line with IAQM Guidance) found potentially significant trip generation during the construction stage along Harbour Way. Therefore, the appropriate study area for the assessment of construction traffic includes the residential receptors located at Byass Street, closest to Harbour Road (Receptors C1 and C2, **Figure 11.1**).

11.27 With respect to the assessment of transport emissions upon ecological receptors, the standard criteria from the IAQM guidance has been adopted, specifically identification of ecological designations within 200m of an 'effected' road. Based on the traffic the M4, which lies within 200m of designated ecological receptors, has been identified as an 'affected' road (as shown in **Figure 11.3**).

11.28 The Eglwys Nunydd Reservoir SSSI is located within 200m of the M4, however, has been discounted based on a review of the APIS website and discussions with the project ecologist, confirming the absence of any qualifying features sensitive to NO_x, NH_3 and nutrient nitrogen deposition (see baseline section of **Chapter 7: Terrestrial Ecology**).

11.29 The Kenfig SAC is located within 200m of M4 and is considered sensitive to emissions of NO_x, NH_4 and nutrient nitrogen deposition and has therefore been included as a receptor.

Background Studies to Inform the ES / Establishing the Baseline

11.30 **Table 11.3** summarises all studies/surveys/analysis/evaluations undertaken to inform the assessment presented within this Chapter.

Table 11.3: Background Studies / Surveys / Evaluations /Analysis

Study / Survey / Analysis / Evaluation	Overview	Date of Completion
Review of on-site emission sources	Through consultation with Technip (Project Design Engineers) and the Applicant a review of all on-site emissions sources was carried out and those considered to generate significant channelled emissions identified for inclusion within the assessment (**Appendix 11.1**).	September 2022 – June 2023
Baseline air quality assessment	Desk-based assessment to ascertain existing pollution concentrations within the study area and to inform the detailed modelling assessment. This included a review of the NPTCBC 2022 Air Quality Progress Report[32], the Welsh Government Air Quality in Wales website[33], background data from the Defra background maps on the UK-Air website[34] and data held on the APIS for ecological sites. No additional monitoring was considered necessary as the monitoring carried out by NPTCB provides sufficient special coverage to provide data representative of the surrounding area. Furthermore, no additional walkover	September 2022 – June 2023

Study / Survey / Analysis / Evaluation	Overview	Date of Completion
	transects were considered necessary given the assessments undertaken as part of the Terrestrial Ecology assessment (as presented in **Chapter 7**) and the level of data set out on the APIS website which provides details on the presence of sensitive species.	

Assessment Process

Assessment of On-site Point Source Emissions

11.31 The assessment of on-site point source emissions has utilised dispersion modelling using the ADMS Extra dispersion model published by the Cambridge Environmental Research Consultancy (CERC) based on a number of on-site sources, determined through engagement with the Project Design Engineers and Applicant (see **Table 11.3**). Details of all identified sources of emissions to air are provided in **Appendix 11.1, Table 11.1.3**, however, only six sources were identified as being necessary for inclusion within the dispersion modelling because of the potentially significant level of emissions being emitted and the associated operational scenarios. These have also been identified based on guidance from the project design engineers. As such, emission from the following plant/equipment, and associated equipment reference utilised within **Figure 4.8** where appropriate, have been modelled. Reference has also been made to the assessment scenarios considered, further details of assessment scenarios are set out in *'Assessment Modelling Scenarios'*.

- **Z-5100** – Ref A1-1 (normal operation), A1-2 (normal operation with liquid firing), A1-3 (emergency operation).
- **Z-7100** and **Z-7160** – Ref A2-1 (emergency operation), A2-2 (start up and shut down).
- **Emergency Diesel Generator** sited within/adjacent to Substation 3000 – Ref A15 (30 minute weekly testing scenario).
- **Emergency Diesel Generator** sited within/adjacent to Substation 2000 – Ref A17 (30 minute weekly testing scenario).
- **Emergency Diesel Generator** sited within/adjacent to Substation 1000 – Ref A18 (30 minute weekly testing scenario).
- **Firewater Pump Engines (Diesel Generator)** sited in close proximity to equipment reference Z4700 – Ref A16 (30 minute weekly testing scenario).

11.32 Emissions from each source identified above would be emitted through emission 'stacks' associated with each of the plant/equipment. Heights and diameters of the stacks are specified within **Appendix 11.1** and accord with the heights set out within **Chapter 4: Development Specification**. All other emission parameters used in the modelling assessment (i.e., exit velocities, exhaust temperature, volume flow and operating hours) are also set out in detail within **Appendix 11.1**.

11.33 The impact of emissions from on-site point source emissions has been predicted using the ADMS Extra dispersion model (version 5.1.0.3, released March 2023). This is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process.

11.34 Quantitative assessment of the impacts on local air quality from point source emissions associated with the operation of the development have been completed against the current statutory standards and objectives set out in the Air Quality Strategy for England, Scotland and Wales, as presented in Table 11.2.1, **Appendix 11.2** for human health. Locations where these objectives apply are provided in Table 11.2.2, **Appendix 11.2**. The pollutants considered within the assessment include NO_x, particulates (PM_{10} and $PM_{2.5}$), SO_2, VOCs, Benzene and CO.

11.35 Impacts on the identified ecological receptors has been undertaken against the objectives set out in Table 11.2.3**, Appendix 11.2,** as defined within the Air Quality Strategy for England, Scotland and Wales and the Critical Loads (CLOs), as sited on the APIS website and set out in Table 11.2.4, **Appendix 11.2.** The pollutants considered are NO_x and SO_2 the associated nutrient nitrogen and acid deposition.

Assessment Modelling Scenarios

11.36 To establish the potential effects of the on-site emissions, it was necessary to establish the likely operating scenarios for each emission source. For some sources this included normal, maintenance and emergency scenarios, where emissions would potentially vary depending on the specific operational scenario. On this basis, a series of operating scenarios have been established, as set out below. Furthermore, these scenarios differed in order to determine long-term emissions and short-term emissions, in order to evaluate emissions against the long-term and short-term objective levels (as defined within the Air Quality Strategy for England, Scotland and Wales, Table 11.2.1 and Table 11.2.3, **Appendix 11.2**).

11.37 To assess long-term emissions during operation all the identified emission sources (except for the emergency flare (A2-1)) have been included within the modelling scenario. This is considered to represent an extremely cautious approach to predicted impacts as it is unlikely that all the emissions sources would be operating simultaneously, for example the emergency generators (sources A15 to A18) would be tested once a week but consecutively, therefore only one would operate at a single time. The emission sources used in the Long-term modelling scenario are shown in **Table 11.4**.

11.38 To predict long-term impacts emissions associated with the intermittent emissions sources (sources A2-2 and A15 to A18), has been adjusted in accordance with guidance produced by the Environment Agency (EA)[35], (which, although withdrawn, provides useful guidance on modelling of point source emissions and is regularly used to determine the approach to modelling such emissions) to ensure that the equivalent total mass emissions released for the intermittent periods are accounted for within the model. Full details are provided in **Appendix 11.3**.

Table 11.4: Emissions Sources used in ADMS Modelling Scenarios

Emission Source	Long-term Scenario	Short-term Scenario	Emergency HP Boiler	Emergency Flare
A1-1 – HP Boiler Normal Operation	X			
A1-2 – HP Boiler Normal Operation Liquid Firing	X	X		
A1-3 – HP Boiler Emergency Situation			X	
A2-1 – Emergency Flare				X
A2-2 – Flare Start up/Shurt-down	X	X		
A15 – Diesel Generator 1	X	X		
A16- Firewater Pumps	X			
A17 – Diesel Generator 2	X			
A18 – Diesel Generator 3	X			

11.39 For assessing short-term concentrations (15-minute, hourly, 8-hourly and 24-hourly), worst-case emission limits have been assumed for the purposes of the modelling assessment and the plant is assumed to be operating at full load, 100% of the time. This is clearly an extreme worst-case but allows for the fact that the plant may be operating during worst-case meteorological conditions. However, to represent a more realistic prediction of impacts only those emissions sources that would be operating simultaneously have been includes, as shown in **Table 11.4**. Of the emergency diesel generators source A15 has been selected to represent the three diesel generators which have higher emissions than the fire pump engines.

11.40 In addition to the above scenarios source A1 and A2 have emergency operating scenarios. It is expected that these would occur once every 10-15 years in significant emergency situations, therefore contribution to regular long-term and short-term pollution concentrations is unlikely to be significant. However, to assess potential impacts during an emergency situation both sources have been assessed individually in terms of short-term impacts (as shown in **Table 11.3**).

11.41 Full emissions data for each emission sources are provided in **Appendix 11.1**.

11.42 The approach to determining each assessment scenario is provided in **Appendix 11.3**.

Local Meteorology and Terrain Data used in Modelling

11.43 The dispersion modelling has been carried out using five years (2018 - 2022) of hourly sequential meteorological data in order to take account of inter-annual variability and reduce the effect of any atypical conditions. Data from the meteorological station at Mumbles Head has been used for the assessment, which is considered to be the closest and most representative meteorological site to Port Talbot.

11.44 Windroses for all years of meteorological data are presented in **Figure 11.4**.

11.45 Local terrain data has also been included in the model to take account of the varying terrain in the area surrounding the Site. A map showing the local terrain levels used in the model is provided in **Figure 11.5**.

11.46 The assessment modelling has utilised the terrain data which represents the existing ground levels. As noted in **Chapter 4: Development Specification** the Proposed Scheme intends to create a singular development platform of 8m AOD. This development platform has not been included within the assessment modelling; however, it is considered that the outputs of modelling represent a worst-case prediction of potential impacts. By increasing the stack height by 8m for each emissions point the dispersion of emissions will significantly increase resulting in lower ground level concentrations. By increasing the development platform by 8m, the effect of emissions would be lower at identified receptors, although it should be noted that the effects of building downwash will not change as the ratio between building height and stack heigh would remain the same as all metrics linked to heights will increase simultaneously and in the same order of magnitude.

Factoring in Building Downwash/Entrainment

11.47 The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to downwash. This occurs when a building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and result in higher ground level concentrations closer to the stack.

11.48 Downwash effects are only significant where building heights are greater than 40% of the emission release height. The downwash structures also need to be sufficiently close for their influence to be significant.

11.49 All buildings/plant/equipment within the Site closest to the emission stacks have been included in the dispersion model to account for potential downwash effects. Details of the building/plant/equipment included in the modelling are set out in **Appendix 11.3**, Table 11.3.1 and shown in **Figure 11.6**, with accord with those identified within **Chapter 4: Development Specification** and **Figure 4.8.** As noted above, the assessment modelling has utilised the terrain data which represents the existing ground levels. As noted in **Chapter 4: Development Specification** the Proposed Scheme propose to create a singular development platform of 8m AOD. This development platform has not been included within the assessment modelling; however, it is considered that the outputs of modelling l represent a worst-case prediction of potential effects due to the increased level of dispersion that would occur by increasing stack heights by a further 8m, resulting in lower ground level concentrations.

Nitric Oxide to NO_2 Conversion

11.50 Oxides of nitrogen (NOx) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO_2. The proportion of NO converted to NO_2 depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O_3).

11.51 A conversion ratio of 70% NO_x:NO_2 has been assumed for comparison of predicted concentrations with the long-term objectives for NO_2, while a conversion ratio of 35% has been utilised for the assessment of short-term impacts, as recommended by Environment Agency AQMAU guidance[36].

Calculation of Deposition Rates for Ecological Receptors

11.52 Guidance AQTAG06 sets out empirical methods for calculating nitrogen and sulphur deposition (N-deposition and S-deposition)) rates based on calculated NO_x and SO_2 concentrations and deposition velocity using the following formula:

$$Dry\ deposition\ flux\ (\mu g/m2/yr) = ground\ level\ concentration\ (\mu g/m3)\ x\ deposition\ velocity\ (m/s)$$

11.53 The AQTAG06 guidance only provides deposition velocities for grassland and forest habitats. The deposition rate for grassland has been used for the purpose of this assessment all the ecological receptors apart from the Tai-Bach and Bryn Goytre Woodlands, as grassland and low-level vegetation are the key habitat present within the corresponding ecological designations, with rates provided in **Table 11.5**. The deposition rates for Woodland have been used for the two ancient woodland sites.

11.54 The resulting nitrogen dry deposition rate (µg/m^2/s) can be converted to N-deposition in kg/ha/yr by multiplying by a factor of 96 (as detailed in **Table 11.5**).

11.55 To calculate Acid deposition a factor of 6.84 is applied to the calculated N-dry deposition flux and a factor of 9.84 applied to the S-deposition flux (**Table 11.5**)**,** as set out in the AQTAG06 guidance. Total acid deposition is subsequently calculated by adding both the N-acid deposition and S-acid deposition.

11.56 The maximum predicted deposition rates are compared with site specific critical loads obtained from APIS, as set out in **Appendix 11.2**. It is noted that no site specific critical loads are defined on the APIS for local designations such as SINCs and AW. The search function has therefore been used within APIS to identify appropriate critical loads based on the identified habitats within these areas.

Table 11.5: Conversion Factors to Calculate Deposition Velocities and Deposition Rates

Pollutant	Dry Deposition Velocity (for grassland)	Dry Deposition Velocity (for woodland)	Deposition Conversion Rate (kg/ha/yr)	Acid Deposition Conversion Factor (keq/ha/yr)
NO_x	0.0015	0.003	95.9	6.8
SO_2	0.012	0.024	-	9.84
NH_3	0.02	0.02	260	18.5

Identification of Sensitive Human Health Receptors

11.57 The term 'sensitive receptors' includes any persons, locations or systems that may be susceptible to changes as a consequence of the proposed development. As detailed in **Appendix 11.2** annual mean objectives are relevant at the facades of residential buildings, schools, hospitals and care homes.

11.58 The sensitive receptors which have been used for modelling purposes are provided in **Appendix 11.4** and are shown in **Figure 11.1**. These include the nearest residential and educational receptors to the Site which represent long-term and short-term exposure. The assessment has also considered the effect of emissions within the Site (as presented as contour plots of concentrations across the Site) to take account of the potential exposure of users of the Site.

11.59 Impacts have also been modelled on a 1km receptor grid centred on the Site and contour plots of predicted annual mean and short-term process contribution for each pollutant showing the dispersion of the point source emissions across the Site and surrounding area for comparison against the air quality objective limits set out in Table 11.2.1, **Appendix 11.2**.

Identification of Sensitive Ecological Receptors

11.60 The assessment of impacts on sensitive habitats and ecosystems have been undertaken in accordance with the DEFRA and Environment Agency's Risk Assessment Guidance[37]. This follows the recommended approach as set out in the Natural Resources Wales website[38].

11.61 Impacts have been predicted at the three SACs located within 10km of the Site (Kenfig Special Area of Conservation (SAC), Crymlyn Bog SAC and Cefn Cribwr SAC) as detailed in **Table 11.2**. The location of the SACs is shown in **Figure 11.2** and full details of each receptor set out in Table 11.4.2, **Appendix 11.4.**

11.62 Where sensitive ecological receptors are present, predicted ground level concentrations of NOx and SO_2 are compared with relevant critical levels, thresholds of airborne pollutant concentrations above which damage may be sustained to sensitive plants and animals.

11.63 The critical levels are based on monitoring criteria and only apply in the following areas:

- More than 20 km from agglomerations; and
- More than 5 km away from other built up areas, industrial installations motorways and major roads with a traffic count of more than 50,000 vehicles per day.

11.64 Nationally around 37% of designated sites currently fall outside the above criteria and are therefore excluded from the objectives, however, the Environment Agency's H1 (now revoked) guidance states that '*the critical levels should be applied at all locations as a matter of policy, as they represent a standard against which to judge ecological harm*' and as a precautionary approach to meet the concerns of the NPTCBC.

Assessment of Transport Emissions

11.65 Impacts associated with construction traffic along Harbour Way and operational traffic along the M4 have been predicted using the ADMS Roads dispersion model (version 5.1.0.3,

released March 2023), in line with the identified appropriate study area (see '*Study Area*' for more details).

11.66 As per '*Local Meteorology and Terrain Data used in Modelling'* meteorological data from Mumbles Head for 2022 has been used within the model.

11.67 Quantitative assessment of the impacts on local air quality from road traffic emissions associated with the construction and operation of the development have been completed against the current statutory standards and objectives set out in Table 11.2.1, **Appendix 11.2** for NO_2, PM_{10} and $PM_{2.5}$ for human receptors and the CLs and CLOs set out in Tables 11.2.3 and 11.2.4, **Appendix 11.2** for ecological receptors.

Emissions Data

11.68 The model has been used to predict road specific concentrations of NO_x and particulate matter (PM_{10} and $PM_{2.5}$) at the selected human receptors and emissions of NO_x and NH_3 at ecological receptors.

11.69 The assessment has predicted air quality during 2022 using 2022 traffic data and with the addition of the construction and operational traffic data where relevant, to ensure a worst-case assessment given that the development is not expected to be fully operational until 2024 when emission rates are expected to be lower.

11.70 The emission factors released by Defra in November 2021, provided in the emissions factor toolkit EFT2021_v11.0[39], have been used to predict traffic related emissions of PM and NO_x.

11.71 The EFT does not include emission rates for ammonia (NH_3) which can be significant when assessing impacts on ecological receptors.

11.72 NH_3 emissions are produced by the control systems that are designed to reduce NO_x emissions from road vehicles. Air Quality Consultants (AQC) published a report discussing emissions of NH_3 from road vehicles and the potential impact on nitrogen-sensitive habitats[40]. To accompany the report AQC have also published vehicle related ammonia emission factors within the Calculator for Road Emissions of Ammonia (CREAM) workbook[41]. NH_3 emissions for the assessment year 2022 have been obtained from the CREAM workbook.

Background Concentrations

11.73 The ADMS model estimates concentrations arising as a result of vehicle emissions. It is necessary to add an estimate of local background concentrations to obtain the total concentration for comparison against the air quality objectives.

11.74 Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been taken from the Defra background maps[42] for assessing impacts on human receptors while background concentrations of NO_x and NH_3 have been taken from the APIS website for predicting impacts on the Kenfig SAC.

Traffic Data

11.75 Traffic data for use in the assessment was taken from the **Transport Assessment**. The trip generation data during the construction and operational stages have been screened against best practice screening criteria to determine the extent of the modelling assessment. A summary of this data and the screening is provided in Table 11.5.2, **Appendix 11.5**.

Determining impacts on human health

11.76 Trip generation from the construction and operational stages have been screened against the following criteria set out in the IAQM & EPUK air quality planning guidance in relation to impacts on human health, which indicates that where the criteria is exceeded there is a high risk of significant impacts on local air quality and a detailed assessment may be required:

- A change in light duty vehicles (LGV) (including cars) of more than 100 per day within or adjacent to an AQMA and more than 500 per day elsewhere;
- A change in heavy duty vehicles (HDV) of more than 25 per day within or adjacent to an AQMA and more than 100 per day elsewhere.

11.77 The traffic data indicates that trip generation from the operational development would fall below the above screening criteria on all road links both within and outside the Port Talbot AQMA, a detailed assessment of operational traffic impacts in respect of human health has therefore been scoped out for further assessment with impacts concluded as being negligible.

11.78 During the construction stage the HDV movements along Harbour Way to the south of the Site, which falls outside the AQMA, exceed the above screening criteria. The impact of construction traffic on human receptors located adjacent to Harbour Way have therefore been assessed using detailed modelling.

11.79 The model has included Harbour Way as the main emissions source which is elevated above the nearby residential properties. Harbour Way has therefore been given a height of 6m within the model.

Determining impacts on Ecological Receptors

11.80 Following consultation with the NPTCBC air quality advisors, concern was raised as to the effectiveness of the following screening criteria, discussed within the IAQM guidance on assessing impacts on designated nature conservation sites, for identifying an 'affected road' where a more detailed assessment of impacts would be required, particularly when taking into consideration in-combination effects:

- A change in LGV or more than 1000 per day and a change in HDV or more than 200 per day.

11.81 Trip generation from the operational development and the identified committed developments (as set out in **Figure 14.1** and discussed in **Chapter 14: Assessment of Cumulative Effects**) fall below the above screening criteria along the M4, which is within 200 m of the Kenfig SAC. However, due to the concerns raised by the NPTCBC advisors, potential impacts associated with operational traffic along the M4 has been carried out.

Base Traffic Data

11.82 Base traffic flows for 2022 for Harbour Way have been provided by SCP based on traffic survey data undertaken for the transport assessment.

11.83 2019 base flows for the M4 have been taken from the Department of Transport (DfT) traffic statistics[43] and factored forward to 2022 using a TEMPro factor of 1.0262 provided by SCP. 2019 base flows have been used over 2021 flows due to the influence of the travel

restrictions imposed by the government during the COVID-19 pandemic on average vehicle movements during this year.

11.84 Trips associated with the construction stage, operational stage and relevant approved projects identified in **Chapter 14: Assessment of Cumulative Effects**, have subsequently been added to the 2022 base flows to obtain the relevant operational scenarios i.e., to assess construction impacts construction traffic has been added to the 2022 base flows, while for the assessment of operational effects, committed development trips and operational traffic has been added to the 2022 base flows. The assessment of construction trips does not include trips associated with the operational stage as these trips would not occur at the same time.

11.85 The traffic data used within the assessment are provided in **Appendix 11.5**.

Model Outputs and Results Processing

Human Receptors

11.86 The ADMS Model has predicted traffic related annual mean emissions of NO_x and PM at the residential properties adjacent to Harbour Way. Relevant background concentrations have subsequently been added to the model outputs to provide the total concentrations of each pollutant.

11.87 The predicted concentrations of NO_x have been converted to NO_2 using the LAQM calculator (Version 8.1, released August 2020) available on the Defra air quality website.

11.88 Analysis of long-term monitoring data suggests that if the annual mean NO_2 concentration is less than 60 µg/m^3 then the one-hour mean NO_2 objective is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment the annual mean concentration has been used to screen whether the one-hour mean objective is likely to be achieved as recommended within LAQM.TG(22). Similar to NO_2, an annual mean PM_{10} concentrations below 32 µg/m^3 is used to screen whether the 24-hour PM_{10} mean objective is likely to be achieved, the approach also recommended within LAQM.TG(22).

Ecological Receptors

11.89 The ADMS model has been used to predict annual mean emissions of NO_x and NH_3 at the Kenfig SAC. Background concentrations of each pollutant have been added to the model outputs to provide total concentrations of each pollutant.

11.90 The predicted NO_x concentrations have been converted to N-Deposition and acid deposition using the approach detailed in the previous section using the conversion factors set out in **Table 11.4**.

Verification of Model Results

11.91 It is recommended that the model results are compared with measured data to determine whether the model results need adjusting to more accurately reflect local air quality. This process is known as verification.

11.92 Within the study area of Port Talbot there are no local roadside air quality monitoring sites against which to verify the model results. Experience of undertaking air quality assessments in similar locations has shown that the ADMS-Roads model, when using EFT emissions data, has a tendency to under-predict roadside concentrations resulting in an adjustment factor to

uplift the predicted NO_x and PM results. To reduce the risk of the model under predicting impacts adjacent to Harbour Way and the M4 the results have been adjusted using an average adjustment factor derived from a number of recent road traffic modelling assessments undertaken by Kairus Ltd which used EFT emission factors to predict concentrations in a similar setting i.e. roadside urban environments. An adjustment factor of 3.14 has been applied to the predicted roadside NO_x concentrations.

11.93 In accordance with recommendations set out in LAQM.TG(22), where PM results cannot be verified, the factor applied to predicted NO_x concentrations should be used. The predicted roadside PM_{10} and $PM_{2.5}$ concentrations have therefore been adjusted by a factor of 3.14.

Selection of Receptors

11.94 To predict impacts associated with traffic emissions the model has been used to predict NO_2 and PM concentrations at two residential properties located adjacent to Harbour Way; receptors C1 and C2 set out in Table 11.4.1, **Appendix 11.4** and shown in **Figure 11.1**. Concentrations have been predicted at 1st floor level within the properties, at a height of 4.5m, due to the adjacent road being 6m above ground level and therefore expected to impact pollution levels at 1st floor level rather than ground level.

11.95 To predict impacts within the Kenfig SAC concentrations of NO_x and NH_3 have been predicted at the receptors set out in **Figure 11.3** representing a transect to the east and west of the M4.

11.96 When considering impacts on designated nature conservation sites there is a requirement, as discussed in the IAQM guidance on assessing impacts at designated conservations sites, to consider the 'in-combination' effects from other approved projects in conjunction with the Proposed Scheme.

11.97 The relevant projects detailed in **Chapter 14: Assessment of Cumulative Effects**, as shown in **Figure 14.1** have been considered within the assessment process to determine the in-combination effects at the three SACs set out in **Table 11.2.**

11.98 In addition to these projects data provided by SCP has included trips associated with the following development as part of the cumulative trips:

- A2020/0014 – Tyn-y-caeau, Margam Road – change of use from dwelling house and annex building into a mixed use development consisting of guest house accommodation of 16 rooms, with associated bar, café and spa facilities plus truck stop with 21 HGV parking spaces.

11.99 **Chapter 14: Assessment of Cumulative Effects** does not include the above project as it falls below the relevant threshold for inclusion (see **Chapter 14: Assessment of Cumulative Effects**) for more details. However, given its inclusion within the traffic data, in conjunction with AP2, it has also been considered in this assessment and therefore modelling of the cumulative position for the purposes of ecological receptors is relatively conservative.

11.100 The assessment within this Chapter has therefore considered the necessary 'in-combination' effects within Kenfig Special Area of Conservation (SAC), Crymlyn Bog SAC and Cefn Cribwr SAC from emissions from both point and traffic sources added together at each receptor.

Assessing Impact from Shipping Emissions

11.101 The potential effects associated with shipping emissions has been considered using the screening approach set out in LAQM.TG(22). Details have been obtained on the anticipated number of shipping movements (as set out in **Chapter 4**) and these have been considered in the context of the following screening criteria set out within the LAQM.TG(22) for assessing scenarios where a port expansion may lead to an increase in shipping activity (i.e. shipping movements and idling at port) or create new exposure near existing emissions sources:

- Are there more than 5,000 large ship movements (i.e. cross-channel ferries, roll on-roll off ships, bulk cargo, container ships, cruise liners etc) per year, with relevant exposure within 250 m of the berths and main areas of manoeuvring; or

- Are there more than 15,000 large ship movements per year, with relevant exposure within 1km of these areas.

Reporting of the Environmental Effect and Significance Criteria

11.102 The assessment of likely significant environmental effects as a result of the Proposed Scheme has taken into account the construction stage and operational stage. The following sections define the approach adopted within the assessment for the determination of sensitivity (or value/importance), magnitude of change (or impact), the level of effect and significance.

Determining Sensitivity of Receptor

11.103 The sensitivity of affected receptors has been considered on a scale of **high**, **medium**, **low** or **negligible**.

11.104 The level of sensitivity of a human receptor has been determined based on the type of receptor and where the air quality objectives apply as detailed in Table 11.2.2, i.e. residential dwellings and educational facilities are considered to be high sensitivity receptors while communal locations where members of the public spend less time, such as activity centres and places of work are consider to be of medium sensitivity.

11.105 In terms of ecological receptors, all the receptors considered within this assessment (i.e. Kenfig SAC, Cefin Cribwr SAC and Crymlyn Bog SAC are considered to be of high sensitivity.

Determining the Magnitude of Change

11.106 The magnitude of change has been considered as the change experienced from the current baseline conditions at the sensitive receptor and has been considered on a scale of **large**, **medium**, **small** or **negligible**.

Human Receptors

11.107 To determine the magnitude of change in terms of air quality when assessing impacts on human receptors the criteria for determining magnitude of long-term effects (i.e. annual mean) set out within the IAQM air quality planning guidance has been used, as set out in **Table 11.6**.

Table 11.6: Data used to determine Magnitude of Change

Long-term Average Concentration at Receptor in Assessment Year	% Change in Concentrations Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Small	Medium
76-94% of AQAL	Negligible	Small	Medium	Medium
95-102% of AQAL	Small	Medium	Medium	Major
103-109% of AQAL	Medium	Medium	Major	Major
110% of AQAL	Medium	Major	Major	Major

11.108 When using the criteria set out in **Table 11.6** the following have been taken into account:

- AQAL – Air Quality Assessment Level which in this assessment refers to the Air Quality Objectives set out in Table 11.2.1, **Appendix 11.2**.
- The percentage change in concentration should be rounded to a whole number.
- The table should only be used with annual mean concentrations.
- The descriptors are for individual receptors only.
- When defining the concentrations as a percentage of the AQAL use the 'without scheme' concentration where there is a decrease in pollutant concentrations and the 'with scheme' concentrations for an increase.
- The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure, less than 75% of this value i.e. well below, the degree of harm is likely to be small. As exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
- It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year, it is impossible to define the new total concentrations without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

11.109 For assessing short-term impacts on human receptors, the guidance suggests that any change of less than 10% of the AQAL are described as ‘negligible’, regardless of existing air quality. Where the short-term effects are 10-20% of the AQAL the magnitude of the impact is described as ‘small’. Impacts of 20-50% and over 50% are described as ‘medium’ and ‘large’, respectively.

11.110 Further assessment of the magnitude of change of short-term effects has been considered in relation to the Acute Exposure Guidelines (AEGL) published by the United States Environmental Protection Agency[44] for NO_2 and SO_2 particularly in relation to impacts on-site

associated with potential exposure of on-site workers and to assess effects as a result of any emergency operation of the flare and gas fired boiler. The AEGL values are intended to protect most individuals in the general population, including those that might be particularly susceptible to the harmful effects of chemicals. Assessment of emissions and associated impacts in accordance with the UK air quality strategy does not relate to work place exposure and therefore the objective limits set out in **Appendix 11.2** do not apply to locations within the Proposed Scheme (i.e. the PDZ). The predicted impacts have therefore used the AEGL to provide an approach to assessing impacts within the Site.

11.111 The relevant AEGL are provided in **Tables 11.7** and **11.8.**

Table 11.7: AEGL USEPA for NO_2 short-term 1-hour Exposure

AEGL Level	ppm	mg/m^3	$\mu g/m^3$
AEGL1	0.5	0.94	940
AEGL2	12	22.6	22581
AEGL3	20	37.6	37636

AEGL1 – notable discomfort, irritation or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure

AEGL2 – irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape

AEGL3 – life threatening health effects or death

Table 11.8: AEGL USEPA for SO_2 short-term Exposure

	10 - 60 minute exposure		
AEGL Level	ppm	mg/m^3	$\mu g/m^3$
AEGL1	0.2	0.524	524
AEGL2	0.75	1.965	1965
AEGL3	30	78.60	78600

AEGL1 – notable discomfort, irritation or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure

AEGL2 – irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape

AEGL3 – life threatening health effects or death

Ecological Receptors

11.112 The IAQM guidance sets out screening criteria for determining whether an effect can be determined as 'not significant' or 'negligible'. For the Process Contribution (PC), the impact is

deemed not significant if the annual mean PC is less than 1% of the CL or CLO and the short-term PC is less than 10% of the CL or CLO. If either of these criteria are exceeded, the effect is not necessarily significant however, it is then necessary to consider the total Predicted Environmental Concentrations (PEC) of deposition (PC plus the background contribution).

11.113 As detailed on the governments website for undertaking risk assessments for environmental permits[45] for designated sites, if the following criteria apply then the emissions are classed as 'not significant' or 'negligible':

- The long-term PC is greater than 1% and the PEC is less than 70% of the long-term standard.

11.114 For local nature sites the following criteria can be used to determine if emissions are not significant:

- The long-term PC is less than 100% of the long-term environmental standard.

11.115 As detailed within the IAQM guidance, the role of the air quality specialist is to assess the potential impacts of the project and to demonstrate that the effects are not likely to have a significant effect (alone or in-combination). Where this is not possible the significance of the impact should be determined through consultation with the project ecologist.

Determining the Level of Effect

11.116 The level of effect has been informed by the magnitude of change due to the Proposed Scheme and the evaluation of the sensitivity of the affected receptor. The level of effect has been determined using professional judgement and **Table 11.9** has been a tool which has assisted with this process.

11.117 Whilst **Table 11.9** provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it has been concluded whether the effect is '*beneficial*' or '*adverse*'.

Table 11.9: Matrix to Support Determining the Level of Effect

		Sensitivity (or value / importance)			
		High	Medium	Low	Negligible
Magnitude of Change	Large	Major	Moderate to Major	Minor to Moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Small	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

11.118 The following terms have been used to define the level of the effects identified and these can be 'beneficial' or 'adverse':

- **Major effect**: where the Proposed Scheme is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity;

- **Moderate effect**: where the Proposed Scheme is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability;

- **Minor effect**: where the Proposed Scheme is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Scheme is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change; and

- **Negligible**: where the Proposed Scheme is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change.

11.119 The duration of the effect has been assessed as either 'short-term', 'medium-term' or 'long-term'. Short-term is considered to be up to 1 year, medium-term is considered to be between 1 and 10 years and long-term is considered to be greater than 10 years.

Determining Significance

11.120 For each effect, a statement has been made as to whether the level of effect is '**Significant**' or '**Not Significant**'. This determination has been based on professional judgement and/or relevant guidance/legislation where applicable.

11.121 Significance has only been concluded for residual effects (i.e. following the identification of secondary mitigation).

Baseline Conditions

NPTCBC Review and Assessment of Air Quality

11.122 NPTCBC has carried out detailed assessments of air quality and has identified a number of locations within the borough where the short-term PM_{10} objective is being exceeded. As a result the Council declared an air quality management area (AQMA) in 2000 covering the majority of land and properties between the Corus Steel Works and the M4 Motorway. The location of the AQMA is shown in **Figure 11.1**.

11.123 The AQMA is declared due to industrial emissions reflecting the industrial nature of the area surrounding the Site.

11.124 As reported in the NPTCBC 2022 LAQM Annual Progress Report, there has been a downward trend in pollution levels in the Taibach Margam area covered by the AQMA since the AQMA was first declared.

11.125 The Site is located on the west of the AQMA. Air quality in the immediate vicinity of the Site has not been found to be exceeding the relevant air quality objectives as set out in Table 11.2.1, **Appendix 11.2**.

Monitoring of Nitrogen Dioxide

11.126 NPTCBC monitor NO_2 concentrations extensively across the borough. Those located within Port Talbot, along with data recorded since 2017, are set out below in **Table 11.10**. The location of the monitoring sites are shown in **Figure 11.7**.

11.127 The diffusion tube data presented in **Table 11.10** shows annual mean NO_2 concentrations below the objective limit at all monitoring sites in the Port Talbot area since 2017. The highest concentrations have been recorded at site 25 on Water Street, which is a roadside site and shows the higher influence from road emissions to NO_2 concentrations compared to industrial emissions.

11.128 The data indicates a downward trend in concentrations at sites PT2 and 3 however at sites 19 and 25 there was little change in concentrations between 2017 and 2019, with a slight increase at site 25.

11.129 It is not possible to monitor short-term NO_2 concentrations using diffusion tubes, however, based on the monitoring data presented in **Table 11.10**, which shows concentrations to be less than 60 µg/m^3 at all locations, the 1-hour objective is not being exceeded at any location within Port Talbot.

Table 11.10: Annual Mean NO_2 Concentrations Recorded in Port Talbot (µg/m^3)

Monitoring Site	Type	Year				
		2017	2018	2019	2020[1]	2021[1]
PT2 – Port Talbot Margam (Fire Station) (automatic monitor)	I	16.0	15.0	15.0	12.0	13.0
3 – 10 College Green	B	13.2	12.1	12.9	10.7	-
19 – Port Talbot Fire Station	I	15.6	13.7	15.7	13.4	15.2
25 – Water St. Port Talbot	R	26.4	24.1	27.7	21.5	26.6

I – industrial, B – Background, R - Roadside

Data in **Bold** shows concentrations above the annual mean objective of 40µg/m^3

[1] *data for 2020 and 2021 has been included for completeness however due to the travel restrictions imposed by the UK Government during these two years as a result of the COVID-19 pandemic, pollution levels were significantly reduced and are not considered to represent normal conditions. Data from these years has not therefore been used to inform the baseline conditions.*

Monitoring of Particulate Matter

PM_{10} Concentrations

11.130 NPTCBC undertake monitoring of PM_{10} concentrations, with the majority of sites located within the Port Talbot AQMA. The location of these sites is shown in **Figure 11.7**. Data recorded since 2017 is presented in **Table 11.11.**

11.131 The data set out in **Table 11.11** shows concentrations have been consistently below the annual mean objective limit of 40 µg/m^3 since 2017 although the data shows now consistent trend in concentrations with little change over the last five years.

11.132 All five monitoring sties have recorded exceedances of the 24-hour objective limit of 50 µg/m^3 since 2017, however as the objective allows for up to 35 exceedances in any given year the objective has been met at all the monitoring sites.

Table 11.11: PM_{10} Concentrations Recorded in Port Talbot (µg/m^3)

Monitoring Site	Type	Year				
		2017	2018	2019	2020[1]	2021[1]
Annual Mean Concentrations (µg/m^3)						
PT2 – Port Talbot Margam (Fire Station) (automatic monitor)	I	23.0	23.0	21.0	21.0	25.0
DS1 – Dyffryn School	I	21.0	-	22.0	23.0	25.0
TW1 – Twll-yn-y Wal Park	I	21.0	21.0	21.0	20.0	20.0
LW1 – Port Talbot Little Warren	I	21.0	21.0	20.0	21.0	18.0
PS2 – Prince Street	I	25.0	23.0	20.0	24.0	20.0
No. of PM_{10} 24-hour Means > 50 µg/m^3						
PT2 – Port Talbot Margam (Fire Station) (automatic monitor)	I	17	11	12	11	33
DS1 – Dyffryn School	I	2	-	2	0	0
TW1 – Twll-yn-y Wal Park	I	3	9	10	7	0
LW1 – Port Talbot Little Warren	I	16	9	9	15	7
PS2 – Prince Street	I	18	12	8	16	3

I – industrial, B – Background, R - Roadside

Data in Bold shows concentrations above the annual mean objective of 40µg/m^3

[1] *data for 2020 and 2021 has been included for completeness however due to the travel restrictions imposed by the UK Government during these two years as a result of the COVID-19 pandemic, pollution levels were significantly reduced and are not considered to represent normal conditions. Data from these years has not therefore been used to inform the baseline conditions.*

$PM_{2.5}$ Concentrations

11.133 NPTCBC also monitor $PM_{2.5}$ concentrations at two sites in Port Talbot. Details of these sites and data recorded since 2017 are set out in **Table 11.12**.

11.134 The data shows that $PM_{2.5}$ concentrations have been meeting the Stage 2 EU limit value of 20 µg/m^3 (as set out in Table 11.2.1, **Appendix 11.2**) since 2017, although the data shows little change in concentrations in the period presented.

11.135 During 2017 concentrations were meeting both the 2028 interim and 2040 long-term EIP target limits of 12µg/m^3 and 10 µg/m^3, respectively (Table 11.2.1, **Appendix 11.2**) and concentrations fell below the long-term target at site PS2 in subsequent years. However, there was a small increase in concentrations at site PT2 in 2018 and 2019 to just above the long-term EIP, although concentrations remain below the interim target at this location.

Table 11.12: Annual Mean $PM_{2.5}$ Concentrations Recorded in Port Talbot (µg/m³)

Monitoring Site	Type	Year				
		2017	2018	2019	2020[1]	2021[1]
PT2 – Port Talbot Margam (Fire Station) (automatic monitor)	I	10	11	11	9	9
PS2 – Prince Street	I	10	9	9	9	9

Monitoring of SO_2

11.136 NPTCBC also monitor concentrations of SO_2 at the PT2 monitoring site. Data recorded at this site during 2022 is provided in **Table 11.13**.

11.137 The data shows that SO_2 concentrations at this monitoring location are meeting the relevant objective limits of 266 µg/m³ as a 15-minute mean, 350 µg/m³ as a 1-hour mean and 125 µg/m³ as a 240hour mean.

Table 11.13: SO_2 Concentrations Recorded in Site PT2 during 2022 (µg/m³)

Monitoring Site	Parameter			
	Annual Mean	No. 24-hour Means >125 µg/m³	No. 1-hour means >350 µg/m³	No. 15-minute means >266 µg/m³
PT2 – Port Talbot Margam (Fire Station) (automatic monitor)	1.84	0 (11)	0 (38)	0 (62)
Percentile is provided in brackets i.e. 99th percentile of 24-hr mean, 99.7th percentile of hourly mean and 99.9th percentile of 15-minute mean				

Defra Background Maps

11.138 Additional information on estimated background pollutant concentrations has been obtained from the Defra background maps provided on UK-AIR, the Air Quality Information Resource[46]. Estimated air pollution concentrations for NO_x, NO_2, PM_{10} and $PM_{2.5}$ have been extracted from the 2018-based background pollution maps for the UK for 2022 and are set out in **Table 11.14**. These maps are available in 1km x 1km grid squares and provide an estimate of concentrations between 2018 and 2030. Concentrations for the relevant grid squares representing the study area are presented.

11.139 The data indicates that background concentrations of all pollutants presented in the vicinity of the Site are considerably below the relevant annual mean objectives, included in **Table 11.14** for ease.

Table 11.14: Annual Mean Background Air Pollution Concentrations from Defra Maps (µg/m³)

Grid Square	Pollutant							
	NO_x	NO_2	PM_{10}	$PM_{2.5}$	SO_2[1]	CO_2	Benzene[3]	1,3-Butadiene[4]
277500, 187500	11.1	8.6	12.9	7.4	4.71	0.09	0.168	0.05
278500, 187500	20.6	14.9	14.0	8.8	4.6	0.09	0.162	0.05
275500, 188500	10.7	8.3	10.7	6.6	12.8	0.09	0.176	0.05
277500, 188500	15.2	11.4	12.9	7.9	5.42	0.10	0.184	0.06
274500, 189500	8.7	6.8	10.4	6.8	9.59	-	-	-
275500, 189500	11.4	8.8	11.7	7.5	9.12	0.10	0.193	0.050
276500, 189500	18.9	13.8	12.8	7.7	5.13	0.0.10	0.199	0.060
277500, 189500	16.4	12.3	13.1	8.3	5.45	0.10	0.190	0.060
275500, 190500	15.1	11.4	12.7	8.0	5	0.210	0.213	0.060
276500, 190500	16.8	12.6	13.2	8.3	4.96	0.10	0.263	0.060
277500, 190500	12.0	9.2	11.5	7.4	4.99	0.10	0.200	0.050
Objective	**-**	**40 µg/m³**	**40 µg/m³**	**20 µg/m³**	**-**	**10 mg/m³**	**5 µg/m³**	**3.25 µg/m³**

[1] SO_2 data taken from the 2001 Defra maps, unadjusted following guidance which indicates that background concentrations have been found to change little across the UK since 2001

[2] data taken from the 2001 Defra maps and adjusted by a factor of 0.448 in accordance with guidance

[3] data taken from the 2001 Defra maps and adjusted by a factor of 0.662 in accordance with guidance

[4] data taken from the 2001 Defra maps and adjusted by a factor of 0.447 in accordance with guidance

Background Concentrations within Designated Ecological Sites

11.140 Background concentrations of NO_x, NH_3 and SO_2 along with background deposition rates within the identified SACs have been taken from the APIS website and are presented in **Table 11.15**. The highest concentration/deposition rate identified within each SAC has been presented to provide a worst-case assessment.

11.141 The data shows that within all SACs concentrations/deposition rates are below the CL and CLOs as presented in Tables 11.2.3 and 11.2.4, **Appendix 11.2.**

Table 11.15: Annual Mean Background Air Pollution Concentrations from Defra Maps (µg/m³)

Designated Site	Pollutant				
	NO_x (µg/m³)	NH_3 (µg/m³)[1]	SO_2 (µg/m³)	N-Deposition (kg/ha/yr)	Acid Deposition (keq/ha/yr)
Little Warren SINC	10.5	-	3.01	8.5	0.61
Lower River AFAN SINC	10.5	-	3.01	8.5	0.61
Harbourside SINC	17.5	-	3.3	8.9	0.63
Watercourse SINC	11.2	-	3.36	8.6	0.62
Tai-Bach AW	14.6	-	4.21	15.0	1.1
Bryn Goytre AW	15.5	-	3.61	15.4	1.1
Kenfig SAC	11.5	1.0	1.5	9.2	0.8
Crymlyn Bog SAC	12.8	-	2.0	9.4	0.8
Cefn Cribwr SAC	12.2	-	2.8	10.6	0.9

[1] background concentrations of NH_3 have only been included for Kenfig SAC as the other site do not fall within 200m of an 'affected' road and therefore have not been assessed in relation to traffic emissions

Future Baseline

11.142 Current emissions data predicts a gradual decline in both background and road related emissions of NO_x and PM. However, current monitoring shows little change in concentrations of these pollutants in recent years within the Port Talbot areas. Although it is expected that concentrations of these pollutants will decline in future years particularly in locations which

are significantly influenced by road traffic sources i.e. roadside locations within the town, due to the significant influence of industrial emissions associated with nearby industrial processes such as the Steel works and taking into consideration the data presented in **Tables 11.9** to **11.12** it is expected that concentrations of these pollutants will remain at current levels into the near future. However, data shows that concentrations are currently meeting the relevant objective limits and therefore the objectives will continue to be met in future years.

11.143 Current monitoring at site PT2 shows that SO_2 concentrations are comfortably below the relevant objective limits within the town of Port Talbot. Concentrations are expected to remain similar in future years and therefore will continue to meet the relevant objectives.

11.144 Data presented in **Table 11.14** and **Table 11.15** shows concentrations of all pollutants being considered within the assessment to be well below the relevant objective limits (less than 75% of the objective). Background concentrations in the area are expected to continue to be well below the objective limits for all pollutants presented in future years.

Primary and Tertiary Mitigation

Construction Stage

11.145 The following primary and tertiary mitigation which has been evaluated as part of the construction stage assessment is outlined below.

- Standard best practice measures for the management of dust from construction sites, as informed by the IAQM Construction Guidance[47] which will include tertiary measures such as fencing/hoarding around the perimeter of the Site, screening of stockpiles, damping down of exposed soils. These measures will be secured through the provision of a CEMP (see **Volume 3: Environmental Management Plan**).

Operational Stage

11.146 No specific primary mitigation which has been evaluated as part of the operational stage assessment.

Assessment of Effects, Secondary Mitigation and Residual Effects

Construction Stage

Change to local air quality in terms of human health and ecology due to transport emissions including vehicle and shipping emissions

11.147 The impact of emissions associated with the construction stage, predicted at receptors C1 and C2 adjacent to Harbour Way are presented in Tables 11.6.1 to 11.6.3, **Appendix 11.6**.

11.148 The modelling assessment has predicted a change in NO_2, PM_{10} and $PM_{2.5}$ concentrations of less than 1 µg/m^3 at both C1 and C2. This equates to less than 1% of the AQAL, which is a negligible effect given that total concentrations remain as less than 75% of the objective limits (see criteria set out in **Table 11.6**).

11.149 The sensitivity of the residential receptors adjacent to Harbour Way (i.e. C1 and C2) is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is a direct, permanent, long-term effect that is negligible.

11.150 As detailed previously, there are no ecological receptors located within 200m of Harbour Way therefore effects on ecological receptors from construction traffic do not require assessment.

11.151 Shipping emissions during construction would be limited as set out within **Chapter 4: Development Specificaiton**, and within the context of the existing shipping movements within Port Talbot Docks, and therefore considered to be negligible.

Secondary Mitigation or Enhancement

11.152 No secondary mitigation or enhancement is required.

Residual Effect

11.153 In the absence of secondary mitigation the residual effects for the residential receptors adjacent to Harbour Way (i.e. C1 and C2) is the same as that reported in the pre-mitigation scenario.

Significance

11.154 This effect is considered to be **Not Significant**.

Operational Stage

Change to local air quality in terms of human health and ecology due to transport emissions including vehicle and shipping emissions

Impacts on Human Receptors

11.155 As detailed in **Appendix 11.5**, Table 11.5.2, vehicular trips associated with the operational development would fall below the relevant IAQM screening criteria for assessing impacts on human receptors, indicating a negligible effect on local air quality at sensitive human receptors both within and outside the AQMA.

11.156 In relation to shipping emissions, NPTCBC have not identified Port Talbot Dock as a significant source of emissions impacting air quality within the town of Port Talbot as part of the regular air quality review and assessment process.

11.157 A review of surrounding land uses in the vicinity of the Site shows a number of sensitive receptors located within 250m of Port Talbot Docks and within 250m of the marine element of the Site, specifically receptors on West End represented by receptors R20 and R21, **Figure 11.1**.

11.158 Data on the number of shipping movements within the Port Talbot Port have been obtained form the Marine Traffic website[48]. The data indicates that over the last month (June 10th – July 10th 2023, there were approximately 322 vessel movements within the port (161 arrivals and 161 departures), giving shipping movements of approximately 4,000 vessels per annum.

11.159 As set out in **Chapter 4: Development Specification** it is expected that the Proposed Scheme will result in approximately 110 (two-way) additional vessel movement a year[c]. The

[c] This has been based on information provided by the Applicant on the basis of the 'smallest' likely ship to be utilised for the transportation of ethanol or SAF (thus creating the most frequent movements in a year) and knowledge of likely usage/production rates from the Proposed Scheme.

frequency of the movements will vary across the year; however, this is equivalent to approximately 2 (two-way) movements a week[d].

11.160 The total 'with development' shipping movements within the port would therefore increase to approximately 4,220 per annum with the addition of the Proposed Scheme. This falls below the screening criteria set out within LAQM.TG(22) i.e less than 5,000 large ship movements per year with relevant exposure within 250 m and less than 15,000 movements per year with exposure within 1km.

11.161 It should be noted that the existing shipping vessels within the port that make up the 4,000 annual base movements do not travel within the area associated with the Site given that the above data collected from the Marine Traffic website relates to the whole harbour/port area and not just the berth and shipping area located adjacent to the site, so the actually shipping movements within 250m of the identified sensitive receptors at West End would fall significantly below 4,000 movements per annum.

11.162 The baseline assessment shows that concentrations of NO_2, PM_{10}, $PM_{2.5}$ and SO_2, the pollutants most influenced by shipping emissions, are well below the current UK air quality objective limits in the vicinity of the port and the marine area of the Site, as indicated by concentrations recorded at monitoring site PT2 (**Tables 11.10** to **11.15**) which is located approximately 250m south-east of West End.

11.163 Based on the above review, which shows that existing pollution levels are well below current objective limits and the change in shipping movements would not result in the LAQM.TG(22) screening criteria being exceeded, and using professional judgement, impacts from shipping movements associated with the operational development would not cause a breach of the objective limits for NO_2, $PM_{10,}PM_{2.5}$ and SO_2 at nearby sensitive receptors and therefore effects would be negligible.

11.164 In summary, the sensitivity of nearby residential receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, permanent, long-term effect this is negligible.

Secondary Mitigation or Enhancement

11.165 No secondary mitigation or enhancement is required.

Residual Effect

11.166 In the absence of secondary mitigation the residual effects is the same as that reported in the pre-mitigation scenario.

Significance

11.167 This effect is considered to be **Not Significant**.

Impacts on Ecological Receptors

11.168 The impact of emissions associated with operational emissions on ecological receptors are presented in Tables 11.8.5 to 11.8.8, **Appendix 11.8**. Impacts have been predicted at the Kenfig SAC only as this site falls within 200m of an 'affected' Road.

[d] Rounded to nearest whole number, on the assumption that the overall annual vessel movements are distributed equally across a 52-week calendar year.

11.169 The results show that impacts from traffic emissions along the M4 are less than 1% of the relevant CL for NO_x and NH_3 and CLO for N-deposition and Acid Deposition. Impacts would also be less than 1% of the CL and CLO as a result of traffic generated by other committed development.

11.170 In summary, the sensitivity of the Kenfig SAC is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, permanent, long-term effect this is negligible.

Secondary Mitigation or Enhancement

11.171 No secondary mitigation or enhancement is required.

Residual Effect

11.172 In the absence of secondary mitigation the residual effects is the same as that reported in the pre-mitigation scenario.

Significance

11.173 This effect is considered to be **Not Significant**.

Change to local air quality in terms of human health and ecology due to on-site emissions associated with heating plant (gas fired boiler) which will be used as the main source of energy on the Site

Impacts on Human Receptors

11.174 The impact of emissions associated with the on-site point source emissions on human receptors are presented in **Appendix 11.7** and **Figures 11.8 - 11.18**. Impacts have been predicted at the receptors set out in **Figure 11.1** for both long-term effects in relation to NO_2, PM_{10}, $PM_{2.5}$, VOC (1,3-Butadiene) and Benzene and short-term effects in relation to NO_2, CO, SO_2 and PM_{10}.

11.175 Effects have been predicted under long-term operating conditions and short-term operating conditions as set out in **Table 11.4**.

11.176 The modelling assessment has found impacts to be negligible in respect of long-term (Tables 11.7.1 to 11.7.5, **Appendix 11.7**) and short-term objective limits (Tables 11.7.6 to 11.7.11, **Appendix 11.7**) at all receptor locations under worst-case operating conditions for both the long-term and short-term operating scenario.

11.177 **Figures 11.8** to **11.12** show the predicted annual mean long-term process contributions associated with the on-site point source emissions. The contours show that at the point of maximum concentration pollutant concentrations are below the relevant objective limits. The contour plots show that the locations of maximum concentration occur within the Site where the annual mean objective limits do not apply therefore the effects are negligible at surrounding human receptors.

11.178 **Figures 11.13** to **11.18** show the predicted short-term process contributions associated with the on-site point source emissions at the point of maximum concentration. The contours in **Figure 11.14** and **11.18** show that at the point of maximum concentration pollutant concentrations are below the relevant objective limits for CO and PM_{10}, therefore the effects are considered to be negligible for these two pollutants at all locations within the Site and at surrounding human receptors both within and outside the AQMA.

11.179 **Figure 11.13** sets out the 99.8th NO_2 process contributions (PC) and shows an area located in the vicinity of the emergency generator that exceeds the 1-hour objective limit of 200 µg/m^3. This area falls within the Site and at all locations outside of the Site the short-term concentrations fall below the objective limit and therefore the effects are negligible on surrounding human receptors both within and outside the AQMQ, as confirmed by data presented in Table 11.7.6, **Appendix 11.7**. The contour plot also confirms that based on normal short-term operating conditions impacts would also be negligible within the Site, the highest impact relating to emissions associated with the emergency generator which is dealt with in the following section.

Secondary Mitigation or Enhancement

11.180 No secondary mitigation is required in relation to the long-term and short-term normal operating scenarios.

Residual Effect

11.181 Residual effects will be negligible.

Significance

11.182 This effect is considered to be **Not Significant**.

Impacts on Ecological Receptors

11.183 The impact of emissions associated with operational emissions on ecological receptors are presented in **Appendix 11.8**. Impacts have been predicted at the SINCs, AW, Kenfig SAC, Crymlyn Bog SAC and Cefn Cribwr SAC receptors set out in **Figure 11.2** and the Kenfig SAC at receptors set out in **Figure 11.3** for NO_x,SO_2, nutrient nitrogen deposition and acid deposition.

11.184 Effects have been predicted under normal operating conditions i.e. long-term emissions. Short-term emissions have not been considered as the relevant CL and CLO's relate to long-term effects.

11.185 The modelling assessment has found impacts to be negligible in respect of emissions associated with on-site point source emissions (Tables 11.8.1 - 11.8.3, **Appendix 11.8**). Predicted concentrations of NO_x, SO_2, N-deposition and Acid-deposition are all less than 1% of the relevant CLs and CLOs at all the identified ecological receptors with the exception of the Watercourse SINC (LE4) in respect of NO_x, therefore the impact of the on-site point source emissions can be deemed as negligible at the Little Warren and Lower River AFAn SINCs, the Tai-Bach and Bryn Goytre Aws, the Kenfig Crymlyn Bogand Cefn Cribwr SACs. And in relation to SO_2, N-Deposition and acid deposition at the Watercourse SINC.

11.186 In respect of NO_x, the PC at the Watercourse SINC is 1.1% of the CL. However, further analysis shows that the PC is less than 100% of the CL, as discussed in paragraph 11.114 for assessing the significance of effects at locally designated sites and the PEC is less than 70% of the CL, as discussed in Paragraph 11.113. The impact on this designated site is therefore concluded at not significant.

11.187 It is noted that the receptors set out in Tables 11.8.1 - 11.8.4 are all located over 200m from the M4 motorway where operational trip generation has the potential to impact pollution levels. Therefore, operational traffic effects are also considered to be negligible at these receptor locations. However, additional modelling was carried out to predict the impact of

operational traffic emissions within the Kenfig SAC, with the results presented in Tables 11.8.5 - 11.8.7.

11.188 The predicted operational concentrations presented in Tables 11.8.5 - 11.8.7 include emissions associated with both on-site point sources and operational traffic, providing a 'complete' impact from all potential sources.

11.189 The predicted effects are all less than 1% of the relevant CL's and CLO's therefore the operational effects are deemed to be negligible at all locations within the Kenfig SAC.

11.190 The in-combination effects of emissions associated with both operational point sources and traffic emissions and operational traffic emissions associated with other committed development are presented in Tables 11.8.5 to 11.8.8, **Appendix 11.8**.

11.191 The in-combination effects are shown to be less than 1% of the relevant CLs and CLOs and therefore are deemed to be negligible for annual mean NO_x, annual mean NH_3, N-deposition and Acid deposition.

11.192 In summary, the sensitivity of the ecological receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, permanent, long-term negligible effect.

Secondary Mitigation or Enhancement

11.193 No secondary mitigation or enhancement is required.

Residual Effect

11.194 In the absence of secondary mitigation the residual effects is the same as that reported in the pre-mitigation scenario i.e. negligible.

Significance

11.195 This effect is considered to be **Not Significant**.

Change to local air quality in terms of human health and ecology due to on-site emissions associated with flare and emergency point sources (i.e. emergency diesel engines and fire water pump)

Impacts on Human Receptors

11.196 The impact of emissions associated with the on-site point source emissions on human receptors are presented in **Appendix 11.7** and **Figures 11.8 - 11.18**. Impacts have been predicted at the receptors set out in **Figure 11.1** for both long-term effects in relation to NO_2, PM_{10}, $PM_{2.5}$, VOC (1,3-Butadiene) and Benzene and short-term effects in relation to NO_2, CO, SO_2 and PM_{10}.

11.197 Effects have been predicted under long-term operating conditions, short-term operating conditions and emergency conditions as set out in **Table 11.4**.

11.198 The modelling assessment has found impacts to be negligible in respect of long-term (Tables 11.7.1 to 11.7.5, **Appendix 11.7**) and short-term objective limits (Tables 11.7.6 to 11.7.11, **Appendix 11.7**) at all receptor locations under worst-case operating conditions across all four assessment scenarios (i.e. Long-term, short-term, emergency HP boiler and emergency flare).

11.199 **Figures 11.8** to **11.12** show the predicted annual mean long-term process contributions associated with the on-site point source emissions are below the relevant objective limits at all locations of relevant exposure (i.e. long-term objectives do not apply within the Site due to the transient nature of users within the Site and that the long-term objectives do not apply at places of work). The long-term effects of emissions associated with the flare and emergency point sources are therefore negligible both within and outside the AQMA.

11.200 **Figures 11.13** to **11.18** show the predicted short-term process contributions associated with the on-site point source emissions at the point of maximum concentration. The contours in **Figure 11.14** and **11.18** show that at the point of maximum concentration pollutant concentrations are below the relevant objective limits for CO and PM_{10}, therefore the effects are considered to be negligible for these two pollutants at all locations within the Site and at surrounding human receptors both within and outside the AQMA.

11.201 **Figure 11.13** sets out the 99.8th NO_2 process contributions (PC) and shows an area located in the vicinity of the emergency generator that exceeds the 1-hour objective limit of 200 µg/m^3. This area falls within the Site and at all locations outside of the Site the short-term concentrations fall below the objective limit and therefore the effects of the flare and emergency generators are negligible on surrounding human receptors outside of the Site both within and outside the AQMA, as confirmed by data presented in Table 11.7.6, **Appendix 11.7**.

11.202 The exceedance of the 99.8th percentile NO_2 is associated with emissions from the emergency diesel generator included within the model. This would indicate that emissions associated with the operation of the other two emergency generators and the fire pump would also result in an exceedance of the objective but within the immediate vicinity of the relevant stack location, due to these point sources having very similar emissions data.

11.203 The EU and UK air quality objective limits set out within Table 11.2.1 do not apply to workplace locations, i.e. at locations within the Site. Consideration of the predicted levels within the Site have therefore been considered in relation to the AEGLs, as detailed in **Tables 11.7** and **11.8**.

11.204 As the emergency generators would only be tested for 30 minutes every two weeks (26 hrs per year), the risk of exposure to levels above 200 µg/m^3 are limited to these testing periods only, therefore the risk is very short-term and intermittent. A review of the predicted concentrations within this area of maximum concentration shows that they exceed AEGL1 but fall well below AEGL2, therefore the risk of significant harm from exposure of site operatives during these testing periods would be low and would be limited to reversable irritation and discomfort (**Table 11.7**).

11.205 **Figures 11.15** to **11.17** show the short-term SO_2 PC and shows a small area within the Site that is predicted to exceed the relevant objective limits for this pollutant. However, the area of exceedance is limited to a very small area in the immediate vicinity of the emergency generator which would occur during periods of bi-weekly testing for each emergency generator and the fire pump i.e. the risk would be very short-term and intermittent. At locations outside of the Site concentrations fall below the relevant objective limits and therefore the effects are negligible on surrounding human receptors outside of the Site (both within and outside the AQMA), as confirmed by data presented in Table 11.7.8 to 11.7.10, **Appendix 11.7**.

11.206 Further assessment of the predicted concentrations at the point of maximum shows exceedance of the AGEL1, however concentrations fall below the AGEL2, therefore the risk of significant harm from exposure of site operatives during these testing periods in relation to SO_2 (i.e. limited to very short time periods) would be low and would be limited to reversable irritation and discomfort.

11.207 Emissions associated with the emergency operation of the gas fired boiler (Source A1-3) are also predicted to be negligible (Tables 11.7.12 to 11.7.13) at all receptor locations and at the point of maximum concentration (**Table 11.7.14**). As concentrations predicted at the point of maximum concentrations are significantly below the relevant objective limits and operation would only occur once every 10-15 years no contour plot representing the predicted short-term effects associated with the emergency boiler has been provided.

11.208 Emissions associated with the emergency flare (Source A2-1) are also predicted to be a magnitude of small in relation to short-term NO_2 concentrations at the two nearest receptors (R1 and R2) but negligible at all other receptors (Table 11.7.15). In relation to all other pollutants impacts are predicted to be negligible (Table 11.7.16).

11.209 At the point of maximum concentration (Table 11.7.14) the predicted 99.8^{th} percentile NO_2 concentration is predicted to exceed the 200 $\mu g/m^3$ objective limit, being the equivalent of 135 % of the AQAL. This is classed as a large effect. However, the impact is predicted immediately adjacent to the flare within the Site boundary (OS Grid reference 276237, 188714, an area which does not represent any high sensitivity receptors and is classed as a place of work). There may be some short-term exposure by site operators in this location, however this would be very intermittent, and it is noted that the emergency flare is expected to operate no more than once every 10-15 years. The predicted concentration is also well below the AEGL1, therefore any exposure by site operatives during an emergency is unlikely to result in any noticeable discomfort or irritation from the short-term, irregular exposure and therefore based on professional judgement the effect is concluded as being negligible.

11.210 Any magnitude of change above negligible, currently considered as small, is associated with NO_2 and SO_2 only and is as a result of operation of the emergency diesel generators, fire pump and the emergency flare. Whilst this is not something that will impact the surrounding community, it may create a short-term impact to workers within the Site, albeit such an impact will be infrequent and short-term (reversible irritation and discomfort) i.e. during bi-weekly testing of the emergency generators and fire pump and very infrequently for the emergency flare i.e. once every 10-15 years.

11.211 In summary, the sensitivity of nearby receptors is considered to be high in relation to surrounding residential receptors but medium in relation to the work place exposure. The magnitude of change is considered to be negligible at all high sensitivity receptors and small at the medium sensitivity, on-site work place receptors. Therefore, there is likely to be a direct, permanent, long-term negligible effect at high sensitivity human receptors and a direct, intermittent, short-term, minor adverse effect at medium sensitive work place receptors.

Secondary Mitigation or Enhancement

11.212 No secondary mitigation or enhancement has been identified.

Residual Effect

11.213 In the absence of secondary mitigation the residual effects is the same as that reported in the pre-mitigation scenario.

Significance

11.214 This effect is considered to be **Not Significant**.

Impacts on Ecological Receptors

11.215 Impact associated with the emergency generators and fire pump on the ecological receptors are captured in the long-term scenario and the results presented in **Appendix 11.8**. Short-term emissions have not been considered as the relevant CL and CLO's relate to long-term effects. Therefore, effects relating to the intermittent, short-term operation of the emergency generators, fire pumps and emergency flare have not been assessed independently, relevant emissions being captured in the long-term scenario.

11.216 Impacts have been predicted at the SINCs, AW, Kenfig SAC, Crymlyn Bog SAC and Cefn Cribwr SAC receptors set out in **Figure 11.2** and the Kenfig SAC at receptors set out in **Figure 11.3** for NO_x, SO_2, nutrient nitrogen deposition and acid deposition.

11.217 Effects have been predicted under normal operating conditions i.e. long-term emissions.

11.218 The modelling assessment has found impacts to be negligible in respect of emissions associated with on-site point source emissions (Tables 11.8.1 - 11.8.4, **Appendix 11.8**). Predicted concentrations of NO_x, SO_2, N-deposition and Acid-deposition are all less than 1% of the relevant CLs and CLOs for all sites except the Watercourses SINC and therefore can be deemed as negligible at these locations and for all CL and CLOs at the Watercourse SINC with the exception of NO_x without further assessment.

11.219 Further analysis of the impacts at the Watercourses SINC shows that NO_x PC (Table 11.8.1, **Appendix 11.8**) is less than 100% of the CL and the PEC is less than 70% of the CL, therefore the overall impact can be classed as not significant, as discussed in paragraphs 11.113 and 11.114.

11.220 The predicted operational concentrations presented in Tables 11.8.5 - 11.8.7 include emissions associated with both on-site point sources and operational traffic, providing a 'complete' impact from all potential sources.

11.221 The predicted effects are all less than 1% of the relevant CL's and CLO's therefore the operational effects are deemed to be negligible at all locations within the Kenfig SAC.

11.222 The in-combination effects, as presented in Tables 11.8.5 to 11.8.8, **Appendix 11.8,** are shown to be less than 1% of the relevant CLs and CLOs and therefore are deemed to be negligible for annual mean NO_x, annual mean NH_3, N-deposition and Acid deposition.

11.223 In summary, the sensitivity of the ecological receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, permanent, long-term negligible effect.

Secondary Mitigation or Enhancement

11.224 No secondary mitigation or enhancement is required.

Residual Effect

11.225 In the absence of secondary mitigation the residual effects is the same as that reported in the pre-mitigation scenario i.e. negligible.

Significance

11.226 This effect is considered to be **Not Significant**.

Limitations and Assumptions

11.227 To ensure transparency within the EIA process, the following limitations and assumptions have been identified.

- The modelling assessment is dependent on emission data provided by Technip Energies (project design engineers) and Applicant associated with the identified point sources within the Site (including details on operational scenarios, operating times, building and stack heights) and traffic data which will have inherent uncertainties associated with them. Further uncertainty will also be introduced as the ADMS model is required to simplify real-world conditions into a series of algorithms.

- Modelling has utilised existing terrain data rather than the proposed 8m AOD development platform set out in **Chapter 4: Development Specification**. However, the application of such level across the PDZ is expected to have minimal influence on the assessment outputs given the existing levels on-site are generally within ±2m of the 8m AOD and changes in height would be generally uniform across the modelled conditions.

- A disparity between national road transport emission projections and measured annual mean concentrations of nitrogen oxides and NO_2 have been identified in recent years. Whilst projections suggest that annual mean concentrations from road traffic emissions should have fallen significantly, monitoring has not reflected this and has shown relatively stable levels in some locations. To reduce limitations within the model the assessment of operational traffic emissions have been predicted using current year (2022) emissions data as opposed to using future year emission data.

- When undertaking modelling of operational traffic emissions the process of model verification and adjustment is undertaken to better represent real-world concentrations and reduce limitations within the model. As there is no appropriate monitoring within Port Talbot to allow this process to be undertaken as adjustment factor has been calculated from modelling results of similar recently completed ADMS roads assessments. This combined with the use of 2022 emissions data is considered to represent worst case assumptions and therefore significantly reduce the limitations of the modelling.

Summary

11.228 **Table 11.16** provides a summary of the effects, receptors, residual effects and conclusions of significance considered within the Chapter.

11.229 The table only provides a summary of the residual effects identified within the assessment and details of all primary, secondary and tertiary mitigation that has been taken into account

is set out in detail within the Chapter and summarised within the Environmental Management Plan included within **Volume 3: Environmental Management Plan**.

Table 11.16: Summary of Residual and Significant Effects

Effect	Receptor	Residual Effect	Is the Effect Significant?
Construction Stage			
Change to local air quality in terms of human health and ecology due to transport emissions including vehicle and shipping emissions	Residential, community and educational facilities	Negligible	No
Operational Stage			
Change to local air quality in terms of human health and ecology due to on-site emissions associated with heating plant (gas fired boiler) which will be used as the main source of energy on the Site	Nearest sensitive human receptors (residential, educational, health facilities) located to the east, northeast, west, north, northwest and west (Please see **Figure 11.1**)	Negligible	No
	On-site receptors (i.e. workers)	Negligible	No
	Ecological Receptors – Kenfig Special Area of Conservation (SAC), Crymlyn Bog SAC and Cefn Cribwr SAC (**Figure 11.2**)	Negligible	No
Change to local air quality in terms of human health and ecology due to on-site emissions associated with flare and emergency point sources (i.e. emergency diesel engines and fire water pump)1	Nearest sensitive human receptors (residential, educational, health facilities) located to the east, northeast, west, north, northwest and west (Please see **Figure 11.1**)	Negligible	No
	On-site receptors (i.e. workers)	Minor	No

Effect	Receptor	Residual Effect	Is the Effect Significant?
	Ecological Receptors – Kenfig Special Area of Conservation (SAC), Crymlyn Bog SAC and Cefn Cribwr SAC (**Figure 11.2**)	Negligible	No
Change to local air quality in terms of human health and ecology due to transport emissions including vehicle and shipping emissions	Nearest sensitive human receptors (residential, educational, health facilities) located adjacent to Harbour Road (Please see **Figure 11.1**)	Negligible	No
	Ecological Receptors – Kenfig SAC/SSSI (**Figure 11.3**)	Negligible	No

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