8.0 Air Quality

8.1 Introduction

8.1.1 This chapter presents the approach and findings of an Air Quality Impact Assessment, completed in support of the planning application in respect of a proposed small-scale energy recovery facility capable of treating 21,000 tonnes per annum of commercial and trade waste currently collected by Biffa. A detailed air quality assessment report are presented an **Appendix 8.1**.

8.1.2 The chapter presents the methodology followed and provides a review of baseline air quality at the proposed site and surrounding area. The results of the assessment of the impact of the proposed development on the baseline conditions are presented, in order to determine the magnitude and significance of the anticipated impact.

8.2 Methodology and Scope

Policy Background

Planning Policy (Wales)

8.2.1 Planning Policy Wales (PPW) outlines the land use planning policies of the Welsh Government. Chapter 13 Part 13.11 of the PPW sets out the development plans for improving the quality of water and air in Wales, and states that:

> *"Development plans are important vehicles for the promotion of environmental protection and should enable consideration of the effects which proposed developments, and transport demand associated with them, may have on air or water quality and the effects which air or water quality may have on proposed developments. Local planning authorities should take account of such quality objectives when preparing development plans and should work closely with pollution control authorities in the preparation of these plans and when determining planning applications.*
>
> *Development plans should include strategic policies on the location of potentially polluting developments and should set out criteria by which applications for such developments will be determined, but they should not exclude provision for such projects or prohibit all applications to set them up. Plans may set out policies and proposals to ensure that incompatible uses of land are separated, in order to avoid potential conflict between different types of development. They should make realistic provision for the types of industry or facility that may be detrimental to amenity or conservation interests, or a potential source of pollution, ensuring resilience to climate change."*

8.2.2 Chapter 13 Part 13.12 of the PPW sets out the development management for improving the quality of water and air in Wales, and states that:

> *"The potential for pollution affecting the use of land will be a material consideration in deciding whether to grant planning permission. Material considerations in determining applications for potentially polluting development are likely to include:*
>
> *location, taking into account such considerations as the reasons for selecting the chosen site itself;*
>
> - *impact on health and amenity;*
> - *the risk and impact of potential pollution from the development, insofar as this might have an effect on the use of other land and the surrounding environment (the environmental regulatory regime may well have an interest in these issues, particularly if the development would impact on an Air Quality Management Area or a SAC);*
> - *prevention of nuisance;*
> - *impact on the road and other transport networks, and in particular on traffic generation; and*
> - *the need, where relevant, and feasibility of restoring the land (and water resources) to standards sufficient for an appropriate after use. (Powers under the Pollution Prevention and Control Act 1999 require an operator to return a site to a satisfactory state on surrender of an Integrated Pollution Prevention and Control Permit)."*

8.2.3 This is applicable to the proposed development. The following chapter provides the results of the air quality impacts assessment of the proposed development and provides evidence that there are no local areas affected by the proposals.

8.2.4 In accordance with the Planning and Compulsory Purchase Act 2004 and the Planning (Wales) Act 2015, Swansea Council is currently adopting a Local Development Plan (LDP) which represents a portfolio of development documents which set out the Deposit Plan planning policy for the Council1. The accompanying planning policy document is the Swansea Unitary Development Plan (UDP) 2008.

8.2.5 Following a review of the relevant development plan policies, the following were identified as being relevant to the potential air quality impacts of the proposed development:

8.2.6 SI 1: Health and Well-being

> *Health inequalities will be reduced, and healthy lifestyles encouraged by ensuring that development proposals:*
>
> *i. Reflect the spatial distribution of need for primary and secondary healthcare provision, ensuring such proposals are accessible by non-car modes and have the potential to be shared by different service providers;*
>
> *ii. Create sustainable places that accord with the principles of Placemaking;*
>
> *iii. Are supported by appropriate social infrastructure and community facilities, with good interconnectivity between places and land uses;*
>
> *iv. Maintain and/or enhance the extent, quality and connectivity of the Active Travel and green infrastructure networks; and*
>
> *v. Do not result in significant risk to life, human health or well-being, particularly in respect of air, noise, light, water or land pollution."*

[1] Swansea Local Development Plan 2010-2025 (https://www.swansea.gov.uk/devplan). 2016

8.2.7 "RP 1: Safeguarding Public Health and Natural Resources

Development that would result in significant risk to: life; human health and well-being; property; controlled waters; or the natural and historic environment, will not be permitted, particularly in respect of:

- *Air, noise or light pollution;*
- *Flood risk;*
- *The quality or quantity of water resources;*
- *Land contamination;*
- *Land instability or subsidence;*
- *Sustainable development of mineral resources; and*
- *Sustainable waste management.*

Development judged to have a significant adverse effect on the integrity of any European Designated Sites, either alone or in combination with other plans or projects, will not be permitted."

8.2.8 "RP 2: Air, Noise or Light Pollution

Where development could lead to exposure to a source of air, noise or light pollution it must be demonstrated that appropriate mitigation measures will be implemented, and incorporated into the design of the development to minimise the effects on future occupants.

Noise sensitive developments will not be permitted where exposure to existing noise generating uses could occur. Development which would cause or result in a significant increase in levels of environmental noise in an identified Quiet Area, or would have unacceptable impacts on the characteristics of tranquillity that led to the designation of a Quiet Area, will not be permitted."

8.2.9 "RP 7: Sustainable Waste Management

"In order to manage waste within the County in a sustainable manner, the development of in-building sustainable waste management facilities involving the transfer, treatment, re-use, recycling, in-vessel composting or energy recovery from waste, will be permitted within Preferred Areas or areas having the benefit of lawful B2 use, provided that there are no significant adverse effects in relation to:

i. Adjoining land uses;

ii. Amenity of neighbouring land uses or individual properties, including the effects of traffic movement and the generation of noise, dust, fumes, vibration and odour;

iii. The highway network;

iv. Visual impact;

v. Natural heritage, cultural and historic environment;

vi. The type, quality and source of waste;

vii. Controlled waters, including water quantity and quality;

viii. Air Quality; and

ix. Public health and well-being.

Development of sustainable waste management facilities in appropriate rural locations, including composting and anaerobic digestion, will be supported subject to the above criteria.

Proposals should conform to the principles of the waste hierarchy and have regard to the nearest appropriate installation concept and self-sufficiency principles where necessary.

Preferred areas for the development of in-building waste management facilities are identified on the Proposals Map. The co-location of waste management facilities to enable the development of heat networks will be supported, subject to the above criteria.

Proposals must be supported by an appropriate Waste Management Assessment."

8.2.10 "RP 11: Sustainable Development of Mineral Resources

The efficient and appropriate use of minerals within the County will be encouraged, including the re-use and recycling of suitable minerals as an alternative to primary won aggregates. The extraction of mineral resources will be permitted where they satisfy the following criteria:

i. It can be demonstrated that there is a requirement for the mineral to meet the need of society either nationally, regionally or locally, and the need cannot be met from secondary or recycled materials or existing reserves;

ii. The proposed end use of the mineral resource is appropriate and represents an efficient use of the resource;

iii. The development would not cause demonstrable harm to the amenities of local communities, in particular with regard to access, traffic generation, noise, vibration, dust, air quality and odour;

iv. The proposal would not result in any significant adverse impacts on public health and well-being;

v. There would be no significant adverse impact, including visual impact, on the landscape, natural heritage, cultural and historic environments;

vi. There would be no significant adverse impact on the quality and quantity of controlled waters;

vii. It can be demonstrated that no significant danger, damage or disruption would arise from subsidence or ground instability;

viii. The minerals will be transported by rail or waterways wherever feasible; and,

ix. Appropriate and progressive restoration and aftercare measures have been submitted, including post closure management of the site and the provision of other appropriate compensatory enhancements.

Within the Gower AONB mineral development will not be permitted. The Council will not support the development of land based unconventional oil or gas operations, including the exploration, appraisal and extraction of oil and gas by unconventional methods (including the making of exploratory boreholes).

Wharves in Swansea Docks used for the unloading of marine dredged sand and gravel will be safeguarded."

European Legislation

8.2.11 European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality "Daughter" Directive – sets ambient air limit values for nitrogen dioxide (NO_2) and oxides of nitrogen (NO_X), sulphur dioxide (SO_2), lead (Pb) and particulate matter (PM);
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene (C_6H_6) and carbon monoxide (CO); and,
- **Directive 2002/3/EC** – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone (O_3) in ambient air.

8.2.12 The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg), for which there is a requirement to reduce exposure to as low as reasonably achievable.

UK Legislation

8.2.13 The Air Quality Standards Regulations (Wales) (2010) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the United Kingdom (UK). The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

8.2.14 The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the impacts of air pollution.

8.2.15 For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments.

8.2.16 The AQOs for pollutants included within the Air Quality Strategy are presented in Table 8.1 along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

Table 8.1 Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50µg/m³ by end of 2004 (max 35 exceedances a year)	24-hour mean	1st January 2005	50µg/m³ by end of 2004 (max 35 exceedances a year)	1st January 2005	Retain Existing
	UK	40µg/m³ by end of 2004	Annual mean	1st January 2005	40µg/m³	1st January 2005	
Nitrogen Dioxide (NO_2)	UK	200µg/m³ not to be exceeded more than 18 times a year	1 Hour Mean	31st December 2005	200µg/m³ not to be exceeded more than 18 times a year	1st January 2010	Retain Existing

Local Authority Pollution Control

8.2.17 The following subsections provide details of Swansea Council air quality obligations applicable to this assessment.

Local Air Quality Management:

8.2.18 Under Section 82 of the Environment Act (1995) (Part IV) LAs are required to periodically review and assess air quality within their area of jurisdiction under the system of LAQM. This Review and Assessment of air quality involves assessing present and likely future air quality against AQO levels. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs. The results of FBC's Review and Assessment of air quality in the Council's area of jurisdiction are reviewed within this Air Quality chapter.

Assessment Methodology

Predicting the Magnitude of Likely Air Quality Significant Impact

8.2.19 The potential environmental effects from the operation of the proposed facility will be assessed according to the latest guidance produced by EPUK and IAQM in January 2017.

8.2.20 The significance of the effects during the plant operations is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall significance of the air quality effects based on severity of air quality impacts.

8.2.21 The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. *The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of air quality objectives. The effects are provided as percentage of the Air Quality Assessment Level (AQAL), which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';*
2. *The absolute concentrations are also considered in terms of the AQAL and are divided into categories for long term concentrations. The categories are based on the sensitivity of the*

individual receptor in terms of harm potential. The degree of potential to change increases as absolute concentrations are close to or above the AQAL;

3. *Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQAL will have higher severity compared to a relatively large change at a receptor which is significantly below the AQAL, >75% AQAL.*
4. *The effects can be adverse when air quality concentration increase or beneficial when concentration decrease as a result of development; and*
5. *The judgement of overall significance of the effects is then based on severity of effects on all the individual receptors considered.*

8.2.22 The impact descriptors for individual receptors are presented in Table below.

Table 8.1 Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
≤75% of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109 of AQAL	Moderate	Moderate	Substantial	Substantial
≥110 of AQAL	Moderate	Substantial	Substantial	Substantial

Note: In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as 'Negligible'.

Background Data

8.2.23 Mapped background pollutant concentrations are available from Department for Environment Food and Rural Affairs (Defra) website:

- (http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html).

8.2.24 The predicted background concentrations in the Archive decrease year on year based on the predicted progressive positive influence of EU and UK air quality legislation.

8.2.25 ADMS Roads has been used to undertake verified baseline modelling to determine baseline pollutant levels (background concentrations) at roadside receptor locations to take into account emissions from traffic.

8.2.26 The existing traffic phase assessment therefore consists of the quantified predictions of the change in NO2 and PM10 for the existing traffic movement. Predictions of air quality at the site have been undertaken using ADMS Roads.

8.2.27 The traffic data are sourced from the Department for Transport (DfT) website for the year of 2012 (existing and baseline conditions).

8.2.28 2012 background concentrations have been used for the model verification and baseline traffic results. Details of background concentrations used for the assessment are presented in the AQA Technical Report.

8.3 Baseline Conditions

8.3.1 This section provides a review of the existing air quality in the vicinity of the development site in order to provide a benchmark against which to assess potential air quality impacts of the proposed facility.

Air Quality Review and Assessment

8.3.2 As required under section 82 of the Environment Act 1995, Swansea Council, has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction.

8.3.3 The assessments have indicated a risk of the Annual Mean and 1-Hour Mean Air Quality Objectives for NO_2, as well as the 24-hour mean for PM_{10} being exceeded at a number of locations within the Council's administrative area. As such, the Council have declared the following AQMA's within the borough:

- Swansea AQMA - An area mainly on the west bank of the Tawe river covering the Hafod district, plus Sketty and Fforestfach.

Air Quality Monitoring

Continuous Monitoring of Nitrogen Dioxide and Particulate Matter

8.3.4 The UK Automatic Urban and Rural Network (AURN) is a country-wide network of air quality monitoring stations operated on behalf of Defra, with monitoring results available from the UK National Air Quality Archive[2]. LAs, including Swansea Council, also undertake ambient pollutant monitoring as part of their commitment to LAQM.

8.3.5 The closest Defra AURN monitoring location to the proposed installation is 'Morriston Groundhog', approximately 1km west-southwest of the site. Morriston Groundhog has been operational since September 2000 and is locate adjacent to the southbound slip road to the busy A4067 dual carriageway at Morriston Underpass.

Table 8.1 Nitrogen Dioxide Concentrations Measured at Morriston Groundhog

Site ID and Name	X	Y	Site Type	Distance to Kerb of Nearest Road (m)	2014 Mean Concentration (µg/m³)	2015 Mean Concentration (µg/m³)	2016 Mean Concentration (µg/m³)
CM2 - Morriston Groundhog	267210	97674	Roadside	4	21.1	20.5	22.3

8.3.6 As the results in Table 8.3 illustrate, there were no monitored exceedances of the relevant AQOs for NO_2 at this Council operated location.

Nitrogen Dioxide Diffusion Tube Monitoring

[2] www.airquality.co.uk.

8.3.7 SC operated a network of non-automatic air quality monitoring in 2016. The closest diffusion tube (No50) was located approximately 400m from the site. The surrounding diffusion tubes are presented in Table below.

Table 8.2 Concentrations of NO_2 at Diffusion Tubes

Diffusion Tube No.	X	Y	Site Type	Distance to Kerb of Nearest Road (m)	2016 Annual Mean Concentration (µg/m³)
43	267093	198063	Roadside	2	34.75
50	268530	197419	Roadside	6	38.03
54	268693	197416	Roadside	9	31.26
56	269306	198661	Roadside	2	20.07
55	268789	197420	Roadside	4	31.21
104	268538	197389	Roadside	8	26.76
111	267705	199426	Roadside	17 (M4)	30.61
147	267165	198580	Roadside	2	26.26
151	267192	198518	Roadside	3	26.74
324	269815	197657	Roadside	10	29.24

8.3.8 As the results in Table 8.4 illustrate, there were no monitored exceedances of the relevant AQOs for NO_2 at nearby diffusion tubes in 2016.

8.3.9 The details of the monitoring data for benzene, sulphur dioxide, heavy metals and others can be found in the Air Quality Assessment report (April 2018) in appendix 8-1.

Background Pollutant Mapping

8.3.10 Background pollutant concentration data on a 1km x 1km spatial resolution are provided by the UK National Air Quality Archive and are routinely used to support LAQM and Air Quality Assessments where local pollutant monitoring has not been undertaken.

8.3.11 The background mapping data have been obtained from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site. In November 2017, Defra issued revised the 2015 based background maps for NO_X, CO, NO_2, PM_{10} and $PM_{2.5}$ which incorporate updates to the input data used for modelling. The updated background mapping data/concentrations relevant to the site and nearest receptors for 2016, are summarised in Table 8.5 below. Predicted SO_2 and C_6H_6 concentrations are based on 2001 emissions data.

Table 8.1 Background Mapping Data - Annual Mean Background Concentrations (µg/m³)

National Grid Reference		NO_X	NO_2	PM_{10}	$PM_{2.5}$	SO_2	CO	C_6H_6
Easting	Northing							
266500	199500	13.49	18.23	13.14	8.68	4.18	110	0.43
267500	199500	15.03	20.53	13.96	9.21	3.12	113	0.44
268500	199500	13.73	18.64	12.86	8.39	2.69	113	0.44
269500	199500	9.38	12.37	11.32	7.44	2.49	109	0.43
266500	198500	10.59	14.08	13.05	8.90	3.06	114	0.46
267500	198500	13.54	18.44	12.83	8.60	3.54	116	0.46
268500	198500	11.41	15.29	12.12	8.02	2.83	114	0.45
269500	198500	14.14	19.22	13.12	8.47	2.63	110	0.43
266500	197500	11.39	15.25	13.64	9.38	3.00	117	0.48
267500	197500	13.14	17.83	12.80	8.53	4.72	118	0.47
268500	197500	12.85	17.46	12.18	8.03	4.32	114	0.45
269500	197500	13.29	18.10	12.36	8.12	3.44	109	0.42
266500	196500	14.58	20.09	13.97	9.58	2.84	112	0.46
267500	196500	13.86	19.08	12.33	8.17	3.73	112	0.45
268500	196500	12.10	16.36	12.32	8.20	3.55	108	0.42
269500	196500	9.73	12.89	11.74	7.82	3.18	105	0.51
Mean		**12.64**	**17.12**	**12.73**	**8.47**	**3.33**	**112**	**0.45**
Min		**9.38**	**12.37**	**11.32**	**7.44**	**2.49**	**105**	**0.42**
Max		**15.03**	**20.53**	**13.97**	**9.58**	**4.72**	**118**	**0.51**

8.3.12 Table 8.5 indicates that background levels are significantly below the relevant AQOs within the vicinity of the proposed facility during 2016.

Sensitive Receptors

8.3.13 Receptors that are considered as part of the air quality assessment are primarily the nearest existing receptors that may be susceptible to exposure to emissions from the proposed facility.

8.3.14 The discrete sensitive receptors identified for the purposes of this assessment are contained in Table 8.6.

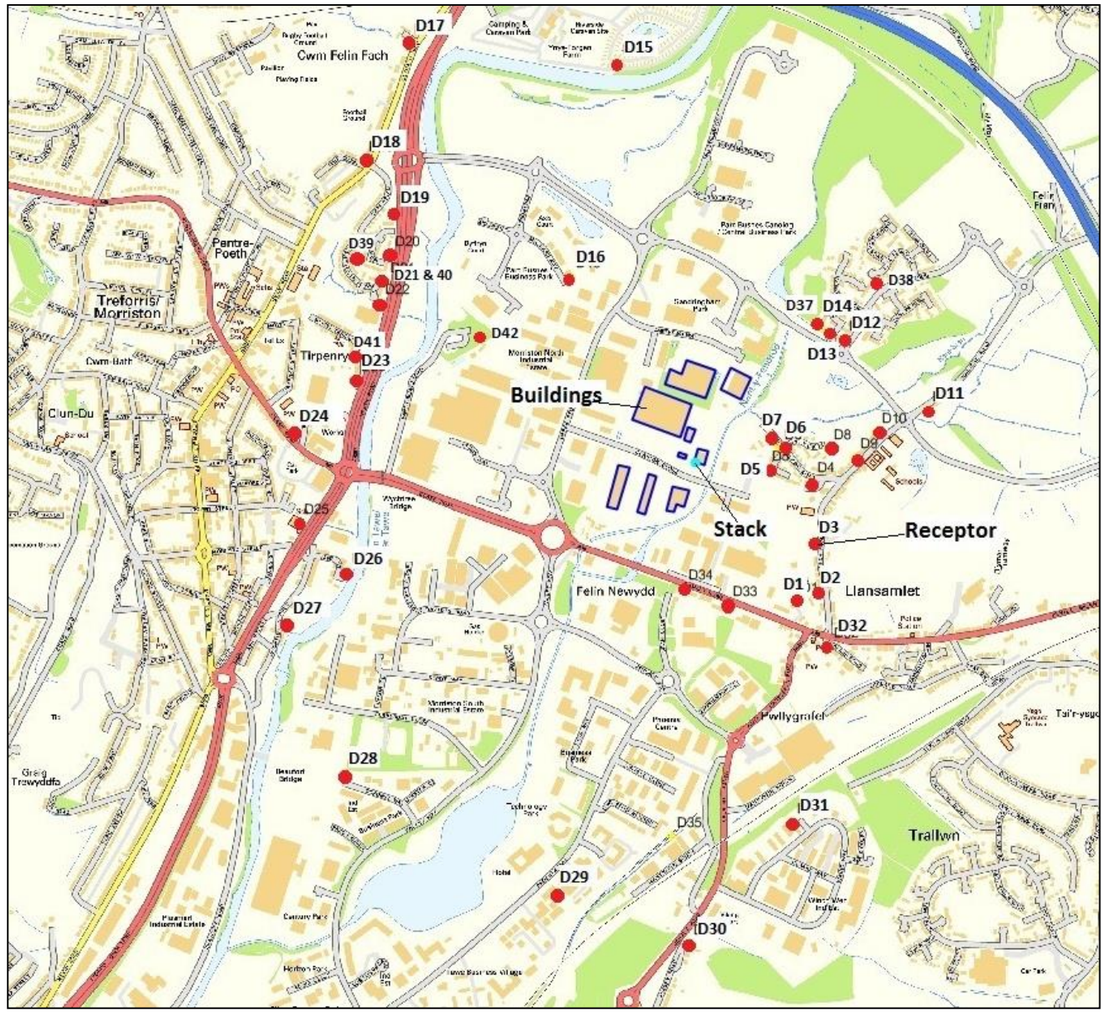
Table 8.1 Modelled Sensitive Receptors

Discrete Sensitive Receptor		Receptor Type	UK NGR (m)	
			X	Y
D1	Fairfield Court	Residential	268533.9	197534
D2	35 Church Road	Residential	268595.8	197557.8
D3	59 Plough & Harrow, Church Road	Residential	268582.8	197693.5
D4	2 Church Road	Residential	268580.6	197859.6
D5	14 Clos y Fendrod	Residential	268454.3	197890.9
D6	25 Panlyblawd Road	Residential	268490.9	197950
D7	Panlyblawd Road	Residential	268464.5	197979.9
D8	30 Nant y Creyr	Residential	268622.7	197948.8
D9	79 Walters Road	Residential	268695.1	197924.2
D10	91 Walters Road	Residential	268753.5	197993.1
D11	158 Walters Road	Residential	268889.2	198052.8
D12	4 Cwrt y Fedwen	Residential	268664.9	198245.5
D13	11 Cwrt y Fedwen	Residential	268617.8	198268
D14	5 Cwrt y Fedwen	Residential	268593.9	198284.2
D15	Riverside Holiday Park	Residential	268051.8	198994.6

Discrete Sensitive Receptor		Receptor Type	UK NGR (m)	
			X	Y
D16	12 Axis Court	Residential	267925.2	198415.3
D17	1 Glyn Himant	Residential	267485.1	199048.4
D18	161 Clydach Road	Residential	267363.7	198730.9
D19	4 Cwm Arian	Residential	267445.2	198587.1
D20	28 Cwrt Cllmeri	Residential	267434	198475.2
D21	45 Cwrt Llwyn Fedwen	Residential	267422	198402.5
D22	57 Cwrt Llwyn Fedwen	Residential	267406.1	198344.9
D23	31 Bush Road	Residential	267342.9	198135.5
D24	80 Clase Road	Residential	267175.9	197990.5
D25	Morriston Primary School	School	267187	197747.8
D26	14 Tawe Street	Residential	267316.7	197613.8
D27	45 Wychtree Street	Residential	267156.4	197473.7
D28	Coronet Way	Residential	267311.7	197065.2
D29	Mowbray House	Residential	267886.2	196742.5
D30	420 Jersey Road	Residential	268242.8	196607
D31	Unit 3 Chamwood Court	Residential	268524	196935.8
D32	8 Midland Road	Residential	268623.3	197412.3
D33	88 Samlet Road	Residential	268350.1	197526.4
D34	Samlet Road	Residential	268230.7	197567.8
D35	Six Pit, Swansea Vale and White Rock, SSSI	SSSI	268198	196897
D36	Crymlyn Bog - Ramsar/SAC/SSSI	Ramsar/SAC/SSSI	269498	195520
D37	Heol Y Celyn	Receptors for Cumulative Impact Assessment only (from (1) the proposed facility and (2) the proposed development of a short-term operating reserve (STOR) peaking power plan)	269498	195520
D38	Maes Y Deri		268589	198279
D39	10 Cwrt Llwyn Fwdwen		268746	198399
D40	51 Cwrt Llwyn Fwdwen		267334	198475
D41	41 Bush Road		267427	198403
D42	Travellers		267351	198188

8.3.15 Reference should be made to Figure 8-1 for a graphical representation of the identified receptor locations.

Figure 8-1 Site Location and Receptor Positions



Ecological Receptors

8.3.16 Air quality impacts associated with the proposed development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2017) require competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Protection Areas).

8.3.17 A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the

Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service.

8.3.18 There is a SSSI of 'Six Pit, Swansea Vale and White Rock' located approximately 1 km south of the installation and a Ramsar/SAC/SSSI of Crymlyn Bog located approximately 2.5 km southeast of the installation. Those identified ecological sites have been assessed as discrete receptors within the assessment.

8.3.19 The ecological receptors (the conservation sites) have been considered where they fall within set distances of the site as below:

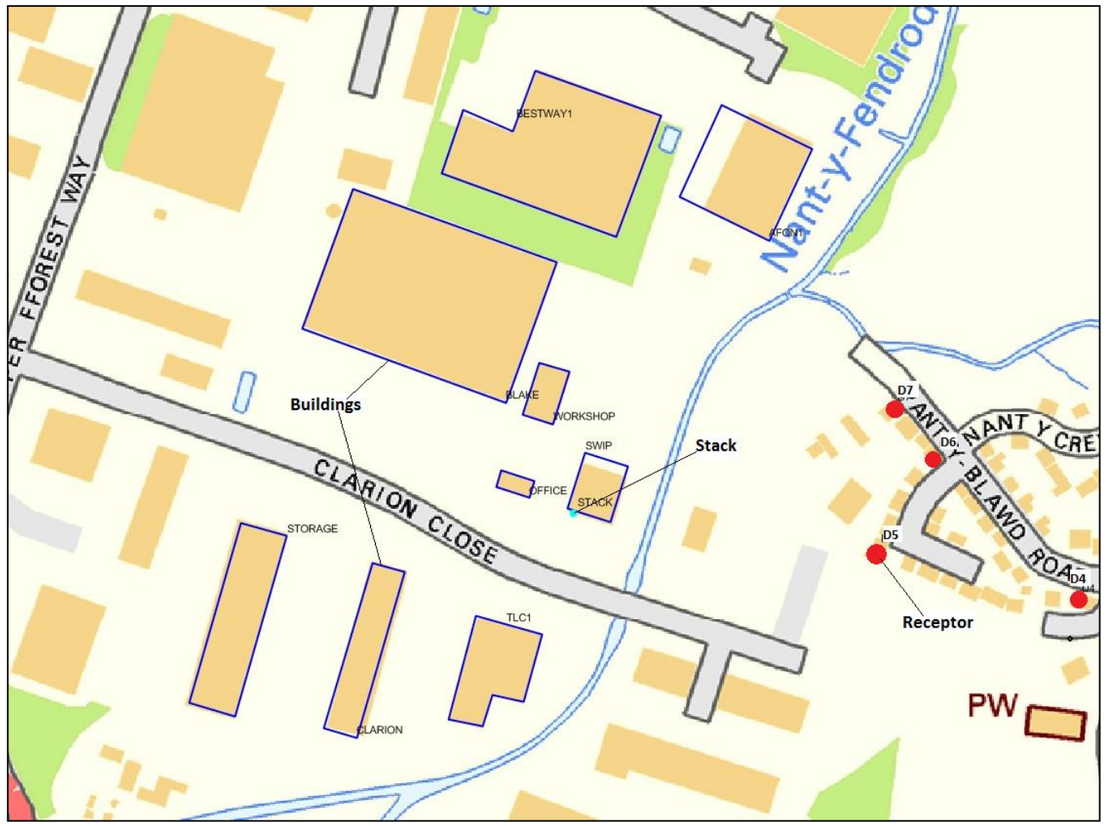
- Special Protection Area (SPAs), Special Areas of Conservation (SACs) or Ramsar site within 10 km of the installation;
- Sites of special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserves (LNRs), local wildlife sites and ancient woodland within 2 km of the location of the installation;
- SINC – Swansea Vale / Fenrod NR (adjacent -eastern boundary) designated for its habitat interest; and
- SINC – Fendrod Lake and Nant y Fendrod (5m south of the site) designated for its habitat interest.

8.3.20 Inputs utilised for normal operation scenario are presented in the Air Quality Assessment report (April 2018) in appendix 8-1.

8.3.21 Input for each emergency scenario run by the dispersion modelling are presented in Table 8.7 below and the detailed emission calculations are presented in Appendix 8-1. The location of the modelled emission point is illustrated by Figure 8-2.

8.3.22 It should be noted that the short-term (15-minute, hourly, 8-hourly, and 24-hourly) impacts assessment have been based on the 30-minute emission limit values (ELVs) detailed in Part 3 of Annex VI of the Industrial Emissions Directive (IED). This approach is to produce the worst case short-term assessment.

Figure 8-2 Modelled Buildings and Source Positions



Modelling Scenarios

8.3.23 The scenarios considered within the Dispersion Modelling Assessment are detailed as below.

Normal Operation Scenario

8.3.24 Scenario 1: Normal operation with the emission rates presented in Section 4.2 using 25m stack height. The long-term emission assessment is based on daily average emission limit values and the short-term emission assessment is based on half-hourly average emission limit values.

Emergency/Abnormal Scenario

8.3.25 Scenario 2 - Emergency/abnormal scenarios: the facility has a number of proposed abatement systems should one or more abatement fail. During a system failure, the proposed facility would have higher than the permitted pollutant emission levels. Industrial Emission directive (IED) sets out the requirement during those abnormal operation situations. This IED's requirements include (1) the small-scale energy recovery plant shall under no circumstances continue to operate for period of more than 4 hours uninterrupted where emission limit values are exceeded; and (2) the cumulative duration of operation in

such conditions over 1 year shall not exceed 60 hours. Only short-term impacts from the abnormal operations have been assessed.

8.3.26 Emergency/abnormal scenarios consider the situation when any of the following abatement systems fails:

- The ceramic filters with the CEMS system failure;
- Sodium bicarbonate powder, system failure; and
- Activated Carbon system failure.

The details of abnormal scenarios and the associated pollutant emission rates are presented in Table 8.7.

Table 8.1 Emergency/Abnormal Scenarios

Scenario	Pollutant Assessed	Emission Limit Value and Half-Hourly average Values (mg/m^3) with Abatement System Working	Reduction Efficiency of the Abatement System (%)	Abnormal Emission Limit Value and Half-Hourly average Values (mg/m^3) when System Fails	Abnormal Emission Rate per Stack (g/s)
The ceramic filters with the CEMS system failure	PM_{10}	30	80% to 90%	30 (1 + 90%) = 57	0.208 x (1 + 90%) = 0.187
Sodium bicarbonate powder system Failure	SO_2	200	50% to 70%	200 (1 + 70%) = 340	1.387 (1 + 70%) = 2.357
Activated Carbon Failure	Dioxins and furans	1×10^{-7}	57% to 84%	1×10^{-7} (1 + 84%) = 1.84×10^{-7}	6.38×10^{-11} (1 + 84%) = 1.17×10^{-10}

8.3.27 It is assumed that the half-hourly (30-minute) average emission limit values for pollutants, e.g., SO_2, will be achieved during the normal operation when proposed abatement system works properly. Each abatement system has a range of reduction efficiency, e.g., 50 % to 70% for a sodium bicarbonate powder system. Under the abnormal condition, however, it is assumed that the system reduction efficiency will become zero, resulting in an increased emission rates for those abnormal scenarios, e.g., 50 % to 70% above of 200 mg/m3 of the half-hourly SO_2 emission limit values for the sodium bicarbonate powder failure.

Modelling Parameter and Averaging Period

8.3.28 The dispersion modelling has assessed cumulative impact of emissions from the facility taking into consideration of the operation of the proposed installation.

8.3.29 The same averaging period should be used for comparison of emissions against environmental standards. For example, most long-term standards are expressed as an annual mean and many short-term standards as an hourly mean. Note that there are certain exceptions to this which are important when considering compliance with statutory EQS. The averaging period associated to the relevant pollution modelled are detailed in Table 8.8.

Table 8.12 Modelling Parameter and Averaging Period

Parameter	Measured as	
	Short-Term	Long-Term
NO_2	99.79th %ile 1-hour mean	Annual mean
NO_X	-	Annual mean(1)
PM as PM_{10}	90.41th %ile 24-hour Mean	Annual mean
PM as $PM_{2.5}$	-	Annual mean
SO_2	99.18th %ile 24-hour	-
	99.73rd %ile 1-hour 15min (99.90%ile 1-hour)	
CO	Maximum 8-hour rolling mean 1-hour Mean	-
VOC (as C_6H_6)	-	Annual mean
Heavy metals	1-hour Mean (Hg, Sb, Cr, Cu, Mn, and V)	Annual mean (Cd, Hg, Sb, As, Pb, Cr, Cu, Mn, Ni, and V)
PAH	-	Annual mean
Dioxins & Furans	-	Annual mean

Limitations in the Assessment

8.3.30 Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty - due to model limitations;
- Data uncertainty - due to errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and,
- Variability - randomness of measurements used.

8.3.31 Potential uncertainties in model results have been minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- Choice of model - AERMOD is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible;
- Meteorological data - Modelling was previously undertaken using three years of meteorological data from the closest observation site to the facility and the worst-case year selected for the assessment;
- Plant operating conditions - Operational parameters were supplied by the process engineer for a similar facility, based on the anticipated fuel and plant size. The permitted limit values for both daily ELVs and 30-minute ELVs have been used for the emissions from the site and therefore the figures are considered to be a worst-case representation of likely operating conditions;
- Background concentrations and existing baseline conditions - Obtained from the DEFRA mapping study and national monitoring networks. The maximum available background concentrations have been used in this assessment to produce the worst-case assessment;
- Variability - All model inputs are as accurate as possible and worst-case conditions have been considered where necessary in order to ensure a robust assessment of potential pollutant concentrations.

8.4 Mitigation within the Submitted Design

Stack Height Identification

8.4.1 Stack height analyses have concluded that the required stack height will be 25m above the ground level.

Major Odour control and Mitigation measures

8.4.2 Potential odour emissions from the SWIP building will be controlled by keeping the building under negative pressure through a building ventilation system.

8.4.3 Odorous air from the building will be going into the combustion process and all of the air from the dryer will be going into a chemical scrubber which will then clean the air and discharge to atmosphere. It is believed that the combusting the extracted air from the building is the best available technology for the control of odour.

8.5 Likely Significant Air Quality Impacts of the Scheme

Construction Phase

8.5.1 There is **not predicted to be a significant** effect during the construction phase, however industry standard best practice mitigation measures will be applied during the construction phase.

Operational Phase

Operational Phase Impacts

8.5.2 Air emissions risk assessment has been undertaken by comparing the impact of the emissions against the EU EID Environmental standards.

8.5.3 All impacts are considered to be direct, permanent, long-term and irreversible in nature. The impacts are determined to be direct as they occur as a result of industrial operations, permanent as they will occur throughout the operational phase, **long-term** because these occur during the entire operational phase, and irreversible as conditions will not return to baseline conditions until cessation of the development. This is applicable to the assessment of all of the following pollutant emissions.

8.5.4 Confidence in these predictions is high given that a detailed dispersion modelling assessment has been undertaken using models verified by the Environment Agency and Defra.

Nitrogen Dioxide

8.5.5 Predicted annual mean short term and long term NO_2 concentrations were assessed against the AQO of 40µg/m^3 and 200µg/m^3 respectively. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level NO2 concentrations.

8.5.6 As indicated in the AQA Technical Report, the likely significant impact on annual mean NO_2 concentration is predicted to be **negligible to slight**, in accordance with the stated assessment methodology and as such is not considered to be significant.

Particulate Matter

8.5.7 Predicted annual mean ground level PM_{10} and $PM_{2.5}$ concentrations were assessed against the AQO of 40µg/m^3. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level PM_{10} concentrations.

8.5.8 As indicated in the AQA Technical Report, the likely significant impact on annual mean PM_{10} concentration is predicted to be **negligible**, in accordance with the stated assessment methodology and as such is not considered to be significant.

Carbon Monoxide

8.5.9 Predicted 1 hour and 8 hour mean ground level CO concentrations were assessed against the AQO of 10000µg/m^3. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level CO concentrations.

8.5.10 As indicated in the AQA Technical Report, the likely significant impact on CO concentration is predicted to be **negligible**, in accordance with the stated assessment methodology and as such is not considered to be significant.

Sulphur Dioxide

8.5.11 Predicted short-term mean ground level SO_2 concentrations were assessed against the short term AQS of 125µg/m^3. The short-term predicted environment concentrations of SO_2 at all receptors are below the relevant short-term AQSs.

Volatile Organic Compounds

8.5.12 Predicted annual mean ground level VOC concentrations were assessed against the long term AQS of 5µg/m^3. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level VOC concentrations.

8.5.13 As indicated in the AQA Technical Report, the likely significant impact on VOC concentration is predicted to be **negligible**, in accordance with the stated assessment methodology and as such is not considered to be **significant**.

Hydrogen Chloride

8.5.14 Predicted 1 hour mean ground level HCL concentrations were assessed against the relevant EAL. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level HCL concentrations.

8.5.15 As indicated in the AQA Technical Report, there were no predicted exceedances of the relevant criteria for HCL at any discrete receptor location. Therefore, the effect is **negligible** and **not significant** in EIA Terms.

Hydrogen Fluoride

8.5.16 Predicted annual mean ground level HF concentrations were assessed against both long and short term AQS. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level HF concentrations.

8.5.17 As indicated in the AQA Technical Report, were no predicted exceedances of the relevant criteria for HCL at any discrete receptor location. Therefore, the effect is **negligible** and **not significant** in EIA Terms.

Dioxins and Furans

8.5.18 There are no air quality standards for dioxins and furans as such it is not possible to determine the magnitude and subsequently significance of the predicted increase in Dioxins and furans exposure as a result of emissions associated with the proposed development. As such the process contribution has been assessed and presented as a percentage of the existing background levels. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level HF concentrations.

8.5.19 As indicated in the AQA Technical Report, the additional contribution to total background is predicted to be small. Therefore, the effect is **negligible** and **not significant** in EIA Terms.

Polychlorinated Biphenyls (PCBs)

8.5.20 Predicted short and long-term ground level PCBs concentrations were assessed against both relevant AQO EALs. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level PCBs concentrations.

8.5.21 As indicated in the AQA Technical Report, were no predicted exceedances of the relevant criteria for both long term and short-term PCB at any discrete receptor location. Therefore, the effect is **negligible** and **not significant** in EIA Terms.

Polycyclic Aromatic Hydrocarbons (PAH)

8.5.22 Predicted long term ground level PAH concentrations were assessed against the relevant EALs. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level PAH concentrations.

8.5.23 As indicated in the AQA Technical Report, the PECs exceeded the relevant AQO for PAH as the background has already been exceeded. However, the long-term PAH impacts is considered insignificant.

Heavy Metals

8.5.24 Predicted ground level concentrations for a number of heavy metals have been assessed. The heavy metals that have been assessed are; Cadmium, Arsenic, Chromium, Long-Term Hexavalent Chromium, Mercury, Nickel, Antimony, Lead, Copper, Manganese and Vanadium. Reference should be made to the AQA Technical Report for detailed results tables of predicted annual mean ground level PAH concentrations.

8.5.25 As indicated in the AQA Technical Report, there were no predicted exceedances of the relevant criteria for all heavy metals at any discrete receptor location. Therefore, the effect is negligible and not significant in EIA Terms.

Traffic Air Quality Assessment

8.5.26 Non-statutory air quality guidance issued by Environmental Protection UK contains advice on the potential significance of changes in traffic flow on air quality. "Development Control: Planning for Air Quality" (2017 update) states that an air quality assessment is likely to be necessary when any development will:

1. *Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight) A change of LDV flows of:*
   - More than 100 AADT within or adjacent to an AQMA
   - More than 500 AADT elsewhere
2. *2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight) A change of HDV flows of:*
   - More than 25 AADT within or adjacent to an AQMA
   - More than 100 AADT elsewhere

8.5.27 This proposal results in an increase above the consented scheme of 62 daily HGV trips to the consented trips, as this is below the 100 HGV specified within the screening document, it is considered that emissions from traffic as a result of the development will be negligible.

Habitat Assessment

8.5.28 The habitat assessment has been undertaken for the identified nature conservation sites.

8.5.29 The annual mean SO2 PECs at all three ecological receptors are bellow the annual mean critical level of 30 µg/m^3 for the protection of vegetation and ecosystems.

8.5.30 The annual mean NO_x process contributions are well below 1% of critical loads at two ecological receptor locations, the impacts of NOx emissions from facility operations to those sites are negligible.

8.5.31 The annual and daily (24hr) means NO_x process contributions and the associated predicted environmental concentrations at as number of ecological receptors surrounding the Site are all below the relevant critical levels for the protection of vegetation and Ecosystems.

Plume Visibility

8.5.32 The results of the plume visibility assessment indicated that there are no visible plume groundings anywhere inside or outside of the Site. Therefore, no visible plume would return to ground level to cause any potential nuisance. The effect is therefore considered negligible.

8.6 Likely Significant Cumulative Impacts

Cumulative Impact Assessment

8.6.1 The cumulative impacts of nitrogen dioxide emissions that results from both (1) the proposed facility and (2) the emissions from traffic associated the proposed development are considered to be 'negligible' for assessed receptors.

8.7 Additional Mitigation Strategies

8.7.1 Potential odour emissions from the SWIP building will be controlled by keeping the building under negative pressure through a building ventilation system.

8.7.2 Odorous air from the building will be going into the combustion process and all of the air from the dryer will be going into a chemical scrubber which will then clean the air and discharge to atmosphere. It is believed that the combusting the extracted air from the building is the best available technology for the control of odour.

8.8 Residual Impacts

8.8.1 Following the applications of additional mitigation strategies, the potential odour impacts on the sensitive receptors from the facility operations are small and the significance of the odour effect on the sensitive receptors is not significant.

8.9 References

- National Planning Policy Framework, Department for Communities and Local Government, March 2012;
- Planning Practice Guidance: Air Quality, March 2014;
- The Air Quality Standards Regulations, 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2011;
- The Environment Act, 1995
- Local Air Quality Management Technical Guidance LAQM.TG(16), DEFRA, February 2018
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07 - Air Quality, Highways Agency, 2007
- Development Control: Planning for Air Quality, National Society for Clean Air and Environmental Protection, 2010
- The Control of Dust and Emissions from Construction and Demolition – Best Practice Guide, Greater London Authority and London Councils, 2006
- Guidance on the Assessment of Dust from Demolition and Construction (Institute of Air Quality Management, 2017)
- Guidance on the Assessment of Mineral Dust Impacts for Planning (Institute of Air Quality Management, 2016)
- Defra Local Air Quality Management Note on Projecting NO_2 concentrations (April 2012)
- Swansea Local Development Plan 2010-2025: Deposit Plan, Adopted July 2016; and
- Swansea Council 2017 Air Quality Progress Report, November 2017.

8.10 Glossary

Term	Definition
AQA	Air Quality Assessment
AQMA	Air Quality Management Area
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
LA	Local Authority
LAQM	Local Air Quality Management
$\mu g/m^3$	Concentration (in micrograms per cubic metre)
UK NGR	UK National Grid Reference
NO_2	Nitrogen dioxide
NO_X	Total oxides of nitrogen
PM_{10}	Particulate matter with a mean hydraulic diameter less then 10µm