Air Quality CONSULTANTS

Air Quality Assessment:
Heol-y-Splot Aggregates Facility, Bridgend

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Executive Summary

The air quality impacts associated with the proposed aggregate recycling facility on land adjacent to Heol-y-Splot in South Cornelly, Bridgend, have been assessed.

An assessment of the emissions from the diesel generator and the recycling plant has demonstrated that the off-site impacts of these emissions will be negligible.

The proposed facility will generate additional traffic on the local road network, but the assessment has shown that the impacts of emissions from these vehicles at existing, sensitive receptors and sensitive ecological sites will be negligible.

During the construction works, a range of best practice mitigation measures will be implemented to reduce dust emissions and the overall effect will be 'not significant'; appropriate measures have been set out in this report, to be included in the Dust Management Plan for the works.

Overall, the construction and operational air quality effects of the proposed aggregate recycling facility are judged to be 'not significant'.

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1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed aggregate recycling facility (the Facility) on land adjacent to Heol-y-Splot, South Cornelly, Bridgend. The proposed Facility comprises the installation of a recycling plant and construction of an office and staff welfare building, weighbridges, weighbridge office, storage, and ancillary works. The development is described as:

"Change of Use to Aggregates Recycling Facility."

1.2 The Facility will lead to changes in vehicle flows on local roads, which may impact on air quality at existing residential properties and sensitive ecological sites along the affected road network. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$), whilst for sensitive ecological sites the main pollutant of concern is nitrogen oxides (NOx).

1.3 The operation of the Facility has the potential to generate dust emissions and therefore impact upon the amenity of nearby sensitive receptors through dust soiling and/or visible dust plumes. Smaller dust particles (PM_{10}, which are <10 µm) remain suspended in the air for longer than larger, visible particles, and are predominantly associated with health effects.

1.4 The proposals for the development include a diesel generator, the emissions from which could impact upon air quality at nearby sensitive receptors. The main air pollutants of concern related to diesel-fired generator plant are nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$).

1.5 There is also the potential for the construction activities to impact upon nearby sensitive receptors. The main pollutants of concern related to construction activities are dust and PM_{10}.

1.6 The location and setting of the proposed development are shown in Figure 1.

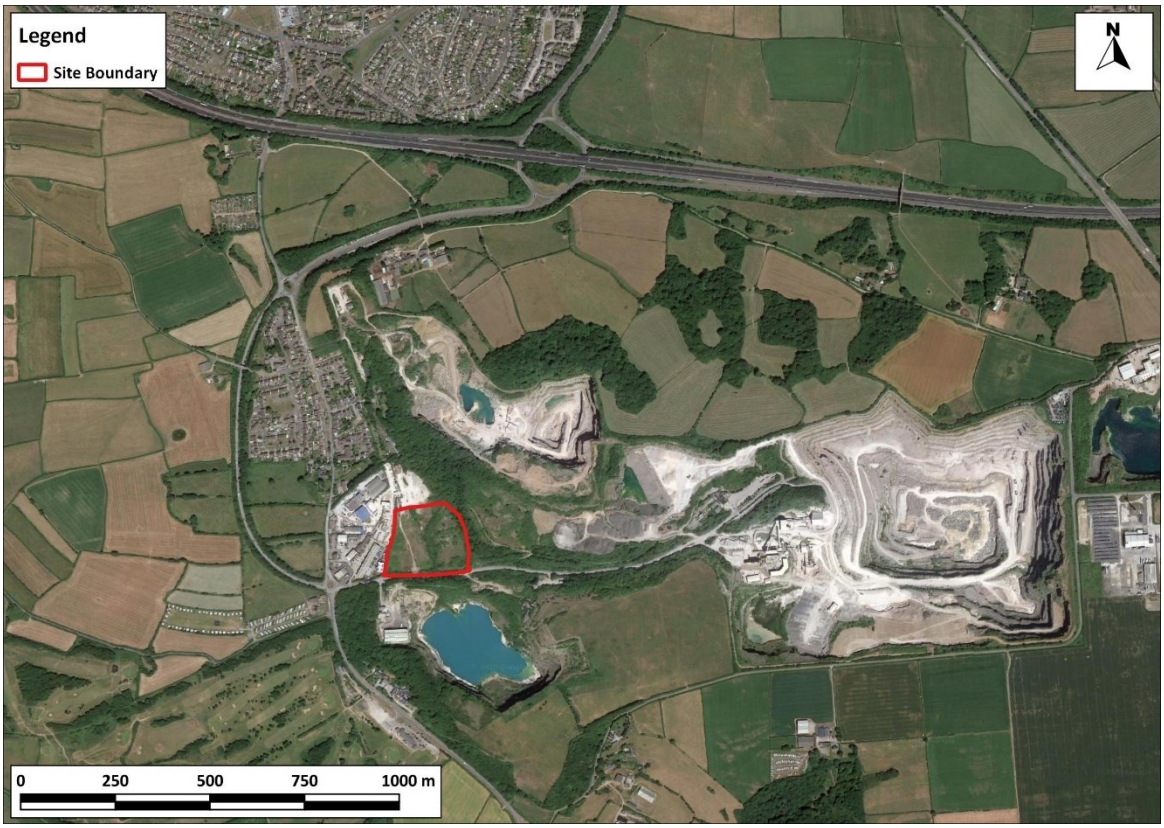

Figure 1: Proposed Development Setting in the Context of Air Quality

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1.7 This report describes existing local air quality conditions (base year 2019), and the predicted air quality in the future assuming that the proposed development does, or does not proceed. The assessment of traffic, plant and operational dust impacts focuses on 2021, which is the anticipated year of opening. The assessment of construction dust impacts focuses on the anticipated duration of the works.

1.8 This report assesses the air quality impacts of the proposed development using an approach and structure that addresses the requirements of a planning submission. The requirements of an environmental permitting application to be submitted to the Environment Agency are specific and differ from the requirements of a planning submission. This report should not, therefore, be submitted in support of an environmental permitting application.

2 Policy Context

2.1 The United Kingdom formally left the European Union (EU) on 31 January 2020; until the end of 2020 there will be a transition period while the UK and EU negotiate additional arrangements. During this period EU rules and regulations will continue to apply to the UK. All European legislation referred to in this report is written into UK law and will remain in place beyond 2020, unless amended, although there is uncertainty at this point in time as to who will enforce the requirements of some of this legislation.

Air Quality Strategy

2.2 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

The Environmental Permitting (England and Wales) (Amendment) Regulations 2018

2.3 The Medium Combustion Plant Directive (MCPD) (The European Parliament and the Council of the European Union, 2015) regulates pollutant emissions from combustion plant with a rated input between 1 and 50 megawatts (MW_{th}) and was transposed into UK law in January 2018 through an amendment to the Environmental Permitting Regulations (2018). The legislation sets emission limits to be applied from December 2018 for new plant and from 2025 or 2030 for existing plant (depending on the rated input). In addition to addressing emissions from plant with a rated input of 1 to 50 MW_{th}, as required by the MCPD, the amendment also introduces emission limits on generator plant, regardless of their rated input.

2.4 The diesel generator within the proposed development may require a permit under these regulations (if the rated input exceeds 1 MW_{th}). If a permit is required, the generator will need to meet a NOx emission rate of 190 mg/Nm^3 at 15% O_2, and a PM emission rate of 10 mg/Nm^3 at 15% O_2.

Clean Air Act 1993 & Environmental Protection Act

2.5 Small combustion plant of less than 20 MW net rated thermal input are controlled under the Clean Air Act 1993 (1993). This requires the local authority to approve the chimney height. Plant which are smaller than 366 kW have no such requirement. The local authority's approval will, therefore, be required for the plant to be installed in the proposed development.

2.6 Measures to ensure adequate dispersion of emissions from discharging stacks and vents are included in Technical Guidance Note D1 (Dispersion) (1993), issued in support of the Environmental Protection Act (1990).

Clean Air Strategy 2019

2.7 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government, in partnership with the Governments of Scotland, Wales and Northern Ireland, will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

The Clean Air Plan for Wales

2.8 In August 2020, the Welsh Government published the Clean Air Plan for Wales (Welsh Government, 2020), which aims to *"improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and our economy"*. The Plan sets out the following four themes, around which the plan is structured, with actions in order to enable collaborative approaches to reducing air pollution:

- People: Protecting the health and well-being of current and future generations;
- Environment: Taking action to support our natural environment, ecosystems and biodiversity;
- Prosperity: Working with industry to reduce emissions, supporting a cleaner and more prosperous Wales; and
- Place: Creating sustainable places through better planning, infrastructure and transport.

2.9 The Plan details intentions to publish a Clean Air Zone Framework in Spring 2021, stating an expectation *"to see Clean Air Zones established in towns and cities throughout Wales to reduce the impact of transport emissions on health. Some of these may be supported by a charging element. Clean Air Zones, where appropriate, would enable a range of co-ordinated actions to deliver significant reductions in public and environmental exposure to harmful airborne pollutants from all sources".*

2.10 The Plan also includes plans to *"introduce LAQM policy changes by 2023 to ensure the regime is public health focused and proactively finding and tackling areas of pollution".* These changes include a focus on the human health impacts of $PM_{2.5}$, stating *"In the current regime, monitoring of $PM_{2.5}$ is encouraged but not mandatory. In the context of the known health impacts associated with $PM_{2.5}$, we propose to investigate the extent to which Local Authorities can support monitoring, reporting and action on $PM_{2.5}$ as part of their existing LAQM functions".*

2.11 The Plan states that the Welsh Government will *"publish and consult on a White Paper on a Clean Air Act for Wales before the end of this Senedd Term",* which will include:

- *"New powers for smoke control linked to tackling air pollution from domestic burning ($PM_{2.5}$)*
- *A requirement for a Clean Air Plan / Strategy to be published / reviewed every 5 years*
- *Potential new air quality targets (for example, taking account of WHO guidelines for air quality)*
- *Clarified and strengthened local air quality management legislation*
- *Strengthened powers to address road vehicle idling*
- *Consolidated powers to implement Clean Air Zones / Low Emission Zones*
- *Focused powers to protect vulnerable groups from the effects of air pollution*
- *Enhanced air quality monitoring and modelling*
- *A potential new duty on public bodies to adhere to guidance encouraging different ways of working and actions to reduce air pollution and support decarbonisation."*

Reducing Emissions from Road Transport: Road to Zero Strategy

2.12 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

2.13 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government has since announced *"plans to bring forward an end to the sale of new petrol and diesel cars and vans to 2035, or earlier if a faster transition is feasible, subject to consultation, as well as including*

hybrids for the first time". If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Planning Policy

National Policies

2.14 Land-use planning policy in Wales is established within the policy document Planning Policy Wales (PPW) (Welsh Government, 2018a), which provides the strategic policy framework for the effective preparation of local planning authority development plans. With regard to pollution and health effects, it states:

"Planning authorities have a role to play in the prevention of physical and mental illnesses caused, or exacerbated, by pollution, disconnection of people from social activities (which contributes to loneliness) as well as the promotion of travel patterns which facilitate active lifestyles. The planning system must consider the impacts of new development on existing communities and maximise health protection and well-being and safeguard amenity. This will include considering the provision of, and access to, community and health assets, such as community halls, libraries, doctor's surgeries and hospitals. Health impacts should be minimised in all instances, and particularly where new development could have an adverse impact on health, amenity and well-being. In such circumstances, where health or amenity impacts cannot be overcome satisfactorily, development should be refused".

"Planning authorities should develop and maintain places that support healthy, active lifestyles across all age and socio-economic groups, recognising that investment in walking and cycling infrastructure can be an effective preventative measure which reduces financial pressures on public services in the longer term. The way a development is laid out and arranged can influence people's behaviours and decisions and can provide effective mitigation against air and noise pollution. Effective planning can provide calming, tranquil surroundings as well as stimulating and sensory environments, both of these make an important contribution to successful places"

"Green infrastructure can be an effective means of enhancing health and well-being, through linking dwellings, workplaces and community facilities and providing high quality, accessible green spaces. In all development and in public spaces especially, there should be sensitive management of light, and exposure to airborne pollution should be kept as low as reasonably practicable. The compatibility of land uses will be a key factor in addressing air quality and creating appropriate soundscapes which are conducive to, and reflective of, particular social and cultural activities and experiences, particularly in busy central areas of towns and cities. Equally, the provision of quiet, tranquil areas which provide peaceful sanctuaries in otherwise noisy environments can help to reduce general levels of pollution and promote both mental and physical well-being".

2.15 PPW places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. Local development plans should enable consideration of the effects that the proposed development may have on air quality, as well as the effect that air quality may have on the proposed development. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location.

2.16 PPW also places considerable emphasis on the Well-being of Future Generations Act (Welsh Government, 2015) with the intention to improve the social, economic, environmental and cultural well-being of Wales, and outlines how this can be achieved through the concept of 'Placemaking'.

2.17 PPW is supported by a series of Technical Advice Notes (TANs) and National Assembly for Wales Circulars. Local planning authorities have to take PPW, TANs and Circulars into account when preparing Development Plans.

2.18 With respect to planning policy guidance, TAN 18 on transport (Welsh Government, 2007) makes reference to local air quality and the need for Air Quality Action Plans to be prepared for any Air Quality Management Areas declared.

2.19 The need for compliance with any statutory air quality limit values and objectives is stressed, and the presence of AQMAs must be accounted for in terms of the cumulative impacts on air quality from individual sites in local areas. New developments in AQMAs should be consistent with local air quality action plans.

Local Transport Plan

2.20 The Bridgend County Borough Council (BCBC) Local Transport Plan (LTP) 2015 – 2030 was published in 2015 (Bridgend County Borough Council, 2015). It sets out priorities for transport over the 15-year period. With relevance to air quality, Key Priority 4 sets out to:

"Encourage safer, healthier and sustainable travel to achieve:

- *Increased take up of active and sustainable travel;*
- *Reduced number of personal injury accidents;*
- *Reduction in the negative impact of transport emissions on health and the environment;*
- *Increased number of journeys to tourism destinations being made by sustainable and active travel modes."*

2.21 Additionally, in specific relation to nitrogen dioxide and PM_{10}, the LTP states:

"*Consistent exposure over long periods to these pollutants affects the health of residents, especially those who live closely adjacent to sensitive sites. It is therefore necessary that the LTP identifies measures that would help reduce the level of pollution.*"

2.22 These measures include: the promotion and improvements to sustainable and active travel alternatives; improvements to public transport infrastructure and services; improvements to key junctions; and the implementation of strategic highways proposal.

Local Policies

2.23 The Bridgend Local Development Plan 2006-2021 (Bridgend County Borough Council, 2013) was adopted in September 2013 and contains the following policies relating to air quality:

2.24 Strategic Policy SP2:

"All development should contribute to creating high quality, attractive, sustainable places which enhance the community in which they are located, whilst having full regard to the natural, historic and built environment by… Avoiding or minimising noise, air, soil and water pollution…"

2.25 Strategic Policy SP3:

"All development proposals should promote safe, sustainable and healthy forms of transport through good design, enhanced walking and cycling provision, and improved public transport provision."

"All development proposals should be designed in a manner that secures the safety of all highway users. In this respect all developments will need to: …provide appropriate measures of mitigation to counter any adverse highway effects of new development..."

2.26 Strategic Policy SP4

"Development proposals will not be permitted where they will have an adverse impact upon: The integrity of the County Borough's countryside; The character of its landscape; Its biodiversity and habitats; and The quality of its natural resources including water, air and soil."

Policy ENV7:

"Development proposals will only be permitted where it can be demonstrated that they would not cause a new, or exacerbate an existing, unacceptable risk of harm to health, biodiversity and/or local amenity due to: Air Pollution… Development in areas currently subject to the above will need to demonstrate mitigation measures to reduce the risk of harm to public health, biodiversity and/or local amenity to an acceptable level."

2.27 Policy PLA5:

"Development which would… create or exacerbate harm to the environment along them; and/or c) not be capable of mitigation; will not be permitted… Factors such as the degree of... air quality will also be considered."

2.28 The Replacement Bridgend Local Development Plan 2018 to 2033 is currently under review. Consultation on the Preferred Strategy was held between September and November 2019.

Air Quality Action Plans

National Air Quality Plan

2.29 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018a) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified.

Welsh Government Supplemental Air Quality Plan

2.30 The Welsh Government has produced a supplemental plan to the 2017 UK plan for tackling roadside nitrogen dioxide concentrations (Welsh Government, 2018b). The document sets out the work done to date to identify how the Welsh Government will reduce concentrations of nitrogen dioxide around roads where levels are above legal limits. The plan expands on Section 7.6 (Additional Actions in Wales) of the 2017 UK plan for tackling roadside nitrogen dioxide concentrations, and sets out how the Welsh Government will comply within the shortest possible time with the limit values for nitrogen dioxide.

Local Air Quality Action Plan

2.31 BCBC declared an AQMA for nitrogen dioxide on 1 January 2019, covering the area between 39 and 105 Park Street. This AQMA is located approximately 8 km east of the proposed development site. The Council is in the process of preparing an Air Quality Action Plan, outlining proposed measures to improve air quality within the AQMA. At the time of writing, the Air Quality Action Plan had not been published.

2.32 Neath Port Talbot Country Borough Council declared an AQMA in July 2000 covering the majority of land and properties between the Corus Steel Works and the M4 Motorway, for exceedances of the 24-hour mean PM_{10} objective. The AQMA is located approximately 7.5 km northwest of the proposed development site. The Council adopted an Air Quality Management Plan in 2002 setting out actions to be taken in pursuit of achieving the air quality objective for PM_{10} within the AQMA (Neath Port Talbot County Borough Council, 2002).

Policy for the Protection of Sensitive Ecosystems

European Policies

2.33 The "Habitats Directive" (The Council of the European Communities, 1992) requires member states to introduce a range of measures for the protection of habitats and species. The Conservation of Habitats and Species Regulations (2017) transpose the Directive into UK law. They require the Secretary of State to provide the European Commission with a list of sites which are important for the habitats or species listed in the Directive. The Commission then designates worthy sites as Special Areas of Conservation (SACs). The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs), with the latter classified under the "Birds Directive" (The European Parliament and the Council of the European Union, 2009), which is implemented in UK law through the Conservation of Habitats and Species Regulations (2010). These sites form a network termed "Natura 2000".

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

2.35 In addition to SACs and SPAs, some internationally important UK sites are designated under the Ramsar Convention. Originally intended to protect waterfowl habitat, the Convention has broadened its scope to cover all aspects of wetland conservation.

2.36 The Habitats Directive (as implemented by the Regulations) requires the competent authority, which in this case will be the planning authority, to firstly evaluate whether the development is likely to give rise to a significant effect on the European site. Where this is the case, it must carry out an 'appropriate assessment' in order to determine whether the development will adversely affect the integrity of the site.

National Policies

2.37 Sites of national importance may be designated as Sites of Special Scientific Interest (SSSIs). Originally notified under the National Parks and Access to the Countryside Act (1949), SSSIs have been re-notified under the Wildlife and Countryside Act (1981). Improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way Act (2000) (the "CROW" act). If a development is "*likely to damage*" a SSSI, the CROW act requires that a relevant conservation body (i.e. Natural Resources Wales) is consulted. The CROW act also provides protection to local nature conservation sites, which can be particularly important in providing 'stepping stones' or 'buffers' to SSSIs and European sites. In addition, the Environment Act (1995) and the Natural Environment and Rural Communities Act (2006) both require the conservation of biodiversity.

2.38 National planning policy on biodiversity and conservation is set out in the NPPF (2019a). This emphasises that the planning system should seek to minimise impacts on biodiversity and provide net gains in biodiversity wherever possible as part of the Government's commitment to halting declines in biodiversity and establishing coherent and resilient ecological networks.

2.39 The Environment (Wales) Act (Welsh Government, 2016) replaces the biodiversity duty in the Natural Environment and Rural Communities Act (2006). This duty requires that public authorities seek to maintain and enhance biodiversity in the proper exercise of their functions. The duty also helps to deliver the sustainable management of natural resources, as it will require public authorities, in delivering the new biodiversity duty, to promote the resilience of ecosystems.

2.40 Local planning authorities should set criteria-based policies against which proposals for any development on or affecting protected wildlife sites will be judged, making distinctions between different levels of site designation. If significant harm from a development cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused.

3 Assessment Criteria

Health Criteria

3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (Wales) Regulations (2000) and the Air Quality (Amendment) (Wales) Regulations (2002).

3.2 The UK-wide objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The $PM_{2.5}$ objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 $\mu g/m^3$ (Defra, 2018b). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level.

3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2018b). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets. They do not apply at offices or other places of work, which are covered by occupational air quality standards.

3.4 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010). The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

3.5 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
Fine Particles (PM_{10})	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3
Fine Particles ($PM_{2.5}$) [a]	Annual Mean	25 µg/m^3

[a] The $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Vegetation and Ecosystems Criteria

3.6 Objectives for the protection of vegetation and ecosystems have been set by the UK Government. They are the same as the EU limit values. The limit values and objectives only apply a) more than 20 km from an agglomeration (about 250,000 people), and b) more than 5 km from Part A industrial sources, motorways and built up areas of more than 5,000 people. Critical levels and critical loads are the ambient concentrations and deposition fluxes below which significant harmful effects to sensitive ecosystems are unlikely to occur. Some of the critical levels are set at the same concentrations as the objectives, but do not have the same legal standing. Typically, the potential for exceedances of the critical levels and critical loads is considered in the context of the level of protection afforded to the ecological site as a whole. For example, the level of protection afforded to an internationally-designated site (such as a SAC) is significantly greater than that afforded to a local nature reserve; reflecting the relative sensitivity of the sites as well as their perceived ecological value. The critical levels relevant to this assessment are set out in Table 2, while the critical loads are provided in Table 3.

Table 2: Vegetation and Ecosystem Critical Levels

Pollutant	Time Period	Critical Level
Nitrogen Oxides (expressed as NO_2)	Annual Mean [a,b]	30 µg/m^3
	24-Hour Mean [a,b]	75 µg/m^3

[a] The critical levels are defined by the World Health Organisation (WHO, 2000).

[b] Away from major sources (see Paragraph 3.6), this critical level is set as an objective (Defra, 2007) and a limit value (The European Parliament and the Council of the European Union, 2008).

Table 3: Vegetation and Ecosystem Critical Loads

Habitat Type (and EUNIS code) [a]	Nutrient Nitrogen (kgN/ha/yr) [b]	Acid Deposition 'N_{max}' (keq/ha/yr) [c]
Broadleaved woodland (G1)	10	11.061 – 11.217
Inland dune pioneer grasslands (E1.94)	8	4.792
Coastal stable dune grasslands (acid type) (B1.4)	8	1.053
Non-Mediterranean dry acid and neutral closed grassland (E1.7)	10	1.011
Moist to wet dune stacks (B1.8)	10	n/a [d]

[a] The European Nature Information System (European Environment Agency, 2020).

[b] Critical loads for nutrient nitrogen taken from (APIS, 2013).

[c] Critical loads for acid deposition have been taken from (APIS, 2020). N_{max} is the value above which additional nitrogen deposition will lead to an exceedance. Where there are multiple receptors within each SAC, the values of N_{max} used are the most stringent across the SACs and are not specific to the receptors assessed.

[d] Critical loads for acid deposition not available for Dunraven Bay SAC.

Construction Dust Criteria

3.7 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)[1] (2016a) has been used. Full details of this approach are provided in Appendix A1.

Operational Dust Guidance and Criteria

3.8 Dust is categorised into two size classifications: 'suspended dust' with diameters below 10 µm (PM_{10} and $PM_{2.5}$) and disamenity dust with diameters between 10 µm to 75 µm.

3.9 Suspended dusts remain in the air for long periods and are fine enough to be inhaled, potentially causing health effects. Disamenity dusts have a larger particle size which deposit on surfaces more easily; they may be visible to the naked eye and can cause disamenity through soiling and staining, being generally associated with nuisance impacts.

3.10 The assessment criteria for suspended dust are the air quality objectives for PM_{10} and $PM_{2.5}$, which are presented in Table 1. Most of the dust from minerals handling, however, will be in the coarse subfraction (i.e. $PM_{2.5}$ to PM_{10}), rather than the fine fraction (i.e. $PM_{2.5}$). There are currently no statutory standards in the UK covering the release and subsequent impacts of nuisance dust, or limit values for dust deposition above which 'nuisance' is deemed to exist. This is due to the inherently subjective nature of nuisance and is highly dependent upon the existing conditions. Determination

[1] The IAQM is the professional body for air quality practitioners in the UK.

of whether or not dust constitutes a statutory nuisance in these cases is usually the responsibility of the local planning authority or Natural Resources Wales.

3.11 The IAQM has produced guidance on the 'Assessment of Mineral Dust Impacts for Planning' (IAQM, 2016b). Full details of this approach are provided in Appendix A1.

Screening Criteria

Road Traffic Assessments

3.12 EPUK and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A3, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.

3.13 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A3) inside an AQMA are a change in flows of more than 25 heavy duty vehicles (HDVs) or 100 light duty vehicles (LDVs) per day; outside of an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

3.14 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

Point Source Assessments

3.15 EPUK and the IAQM have developed an approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from point sources, such as generator plant, have the potential for significant air quality impacts. The first step of the approach, as described in Appendix A3, is to screen the emissions and the emissions parameters to determine whether an assessment is necessary:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

3.16 This screening approach requires professional judgement, and the experience of the consultants preparing the assessment is set out in Appendix A4.

3.17 If it is determined that an assessment of the point source emissions is required then there is a further stage of screening that can be applied to the model outputs. The approach is that any change in concentration smaller than 0.5% of the long-term environmental standard will be *negligible*, regardless of the existing air quality conditions. Any change smaller than 1.5% of the long-term environmental standard will be *negligible* so long as the total concentration is less than 94% of the standard and any change smaller than 5.5% of the long-term environmental standard will be *negligible* so long as the total concentration is less than 75% of the standard. The guidance also explains that:

"Where peak short term concentrations (those averaged over periods of an hour or less) from an elevated source are in the range 11-20% of the relevant Air Quality Assessment Level (AQAL), then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. In most cases, the assessment of impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short-term impacts. The severity of the impact will be substantial when there is a risk that the relevant AQAL for short-term concentrations is approached through the presence of the new source, taking into account the contribution of other local sources".

3.18 The diesel generator and the recycling plant within the proposed development have been considered in combination for this assessment. As a first step, the assessment of the emissions from the generator and recycling plant has considered the predicted process contributions using the following criteria:

- is the long-term (annual mean) process contribution less than 0.5% of the long-term environmental standard?; and
- is the short-term (24-hour mean or shorter) process contribution less than 10% of the short-term environmental standard?

3.19 Where both of these criteria are met, then the impacts are *negligible* and thus 'not significant'. Where these criteria are breached then a more detailed assessment, considering total concentrations (incorporating local baseline conditions), has been provided.

Vegetation and Ecosystems

3.20 In terms of the potential for ecological impacts on local (as opposed to national or European) wildlife sites, the Environment Agency's Air Emissions Risk Assessment guidance (Environment Agency, 2016) discounts as insignificant any impacts where the PC is less than 100% of the long-term or short-term environmental standard. For national or European sites, the Environment Agency's guidance explains that, regardless of the baseline environmental conditions, a process can be considered as insignificant if:

- the long-term (annual mean) process contribution is <1% of the long-term environmental standard; and
- the short-term (15-minute, 1-hour, 24-hour mean) process contribution is <10% of the short-term environmental standard.

3.21 It should be recognised that these criteria determine when an impact can be screened out as insignificant. They do not imply that impacts will necessarily be significant above one or both of these criteria, merely that there is a potential for significant impacts to occur that should be considered using a detailed assessment methodology, such as a detailed dispersion modelling study (as has been carried out for this project in any event). The next step in the Environment Agency's screening process for long-term contributions is to add the process contribution (PC) to the local background concentration to calculate the predicted environmental concentration (PEC). For short-term contributions the PC is compared against the short-term environmental standard minus twice the long-term background concentration. The emissions are insignificant if:

- the long-term PEC is less than 70% of the long-term environmental standard; and
- the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration.

3.22 However, the Environment Agency also advises that, where detailed dispersion modelling has been undertaken, no further action is required if resulting PECs do not exceed environmental standards.

3.23 It should also be noted that the previously mentioned EPUK and IAQM guidance does not apply to nature conservation sites, thus the use of the Environment Agency guidance is most appropriate for assessing impacts on ecosystems.

3.24 For the purposes of this assessment, wherever the detailed modelling shows that concentrations and fluxes are below the critical level or critical load, it is considered that there will be no significant impacts.

Screening Criteria for Dust Assessments

3.25 The IAQM Guidance on the assessment of Mineral Dust Impacts for Planning (IAQM, 2016b) details screening criteria to determine whether dust emissions have the potential for significant air quality impacts. The screening criteria are designed for minerals sites, but in the absence of other published criteria for aggregate processing plants, they have been applied in this assessment. The screening criteria are based on the distance of receptors to dust generating activities and are as follows:

- if there are no relevant receptors within 1 km of the operations, then a detailed dust assessment can be screened out. In such a case, it is considered that, irrespective of the nature, size and operation of the site, the risk of an impact is likely to be 'negligible' and any resulting effects are likely to be 'not significant';
- in cases whereby receptors are located between 400 m or 250 m (depending on the rock type) and 1km of operations, it would normally be assumed that a detailed disamenity dust impact assessment is not required. However, the decision on whether to assess should be made and justified on a site-specific basis; and
- if there are relevant human and/or ecological receptors within 250 m or 400 m (depending on the rock type) then a disamenity dust impact assessment will almost always be required.

3.26 Where the potential dust impact of a mineral site cannot be screened out, a more detailed dust assessment is required, as is the case for this assessment.

4 Assessment Approach

Study Area

4.1 The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts of the onsite operations and diesel generator are anticipated to be greatest. It includes receptors within the South Cornelly Industrial Estate to the west of the site, and residential receptors within South Cornelly and to the west of the A4229.

4.2 The study area covers a 10 km x 10 km model domain, centred on the generator exhaust within the Facility, described further in Paragraph 4.7.

4.3 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles within 500m of the site. The specific areas considered are detailed in Section 6.

Receptors

4.4 Concentrations of nitrogen dioxide and PM_{10} have been predicted at a number of locations close to the Facility. Receptors have been identified to represent a range of exposure, including worst-case locations (these being at the façades of the properties closest to the sources).

4.5 Twelve receptors have been identified for the assessment which represent existing residential properties, and a range of exposure within the industrial estate, including commercial and industrial units and vehicle repair shops. They are described in Table 4 and shown in Figure 2. It should be noted that, as discussed in Paragraph 3.3, the annual mean nitrogen dioxide and PM_{10} objectives, and the 24-hour mean PM_{10} objective, apply at the residential properties only, and the 1-hour mean nitrogen dioxide objective applies at locations where members of the public might regularly spend 1-hour or more, i.e. the café/takeaway. The objectives do not apply at any of the industrial units as these are classed as places of work, which are covered under different legislation, but have been included to address comments from the Council in relation to impacts at these locations. Selected human receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the proposed development and the overall significance of effects.

4.6 Pollutant concentrations have also been predicted at 21 ecological receptors close to the Facility. These are located at locally designated sites within 2 km of the Facility, and at international designated sites within 10 km of the Facility. They are described in Table 4 and shown in Figure 3 and Figure 4.

Table 4: Description of Receptor Locations

Receptor	Description	X coordinate	Y coordinate	Height Modelled (m)
Human Receptors [a]				
R01	Industrial (STOR) [b]	282132	180020	1.5
R02	Café	282036	179995	1.5
R03	Industrial/commercial/vehicle repair	282122	180063	1.5
R04	Industrial/commercial	282071	180103	1.5
R05	Industrial/commercial	282097	180145	1.5
R06	Takeaway	282055	180152	1.5
R07	Industrial/commercial	282143	180223	1.5
R08	Residential	282031	180213	1.5
R09	Residential (care home)	282054	180293	1.5
R10	Residential	282157	180312	1.5
R11	Residential	281957	179902	1.5
R12	Industrial (recycling facility)	282165	179845	1.5
Ecological Receptors				
E01	Ancient Woodland	282060	179852	1.5
E02	Ancient Woodland	282448	180482	1.5
E03	Ancient Woodland	282952	180581	1.5
E04	Ancient Woodland	283200	180499	1.5
E05	Ancient Woodland	283679	180711	1.5
E06	Ancient Woodland	283899	180637	1.5
E07	Ancient Woodland	283051	179278	1.5
E08	Ancient Woodland	283685	178606	1.5
E09	Kenfig Pool and Dunes National Nature Reserve	280383	180765	1.5
E10	Ancient Woodland	282052	178622	1.5
E11	Kenfig / Cynffig SAC	280190	180837	1.5
E12	Glaswelltiroedd Cefn Cribwr / Cefn Cribwr Grasslands SAC	284148	181869	1.5
E13	Glaswelltiroedd Cefn Cribwr / Cefn Cribwr Grasslands SAC	285510	181723	1.5
E14	Glaswelltiroedd Cefn Cribwr / Cefn Cribwr Grasslands SAC	285521	183041	1.5
E15	Glaswelltiroedd Cefn Cribwr / Cefn Cribwr Grasslands SAC	286580	182908	1.5
E16	Kenfig / Cynffig SAC	284387	177499	1.5
E17	Dunraven Bay SAC	288596	172898	1.5
E18	Kenfig / Cynffig SAC	280678	182185	1.5
E19	Cynffig / Kenfig SSSI	280744	182219	1.5

Receptor	Description	X coordinate	Y coordinate	Height Modelled (m)
E20	Stormy Down SSSI	284384	180940	1.5
E21	Stormy Down SSSI	284375	180974	1.5

[a] A height of 1.5 m is used to represent ground-floor level exposure.

[b] The STOR is not considered a human receptor, but has been included at the request of BCBC.

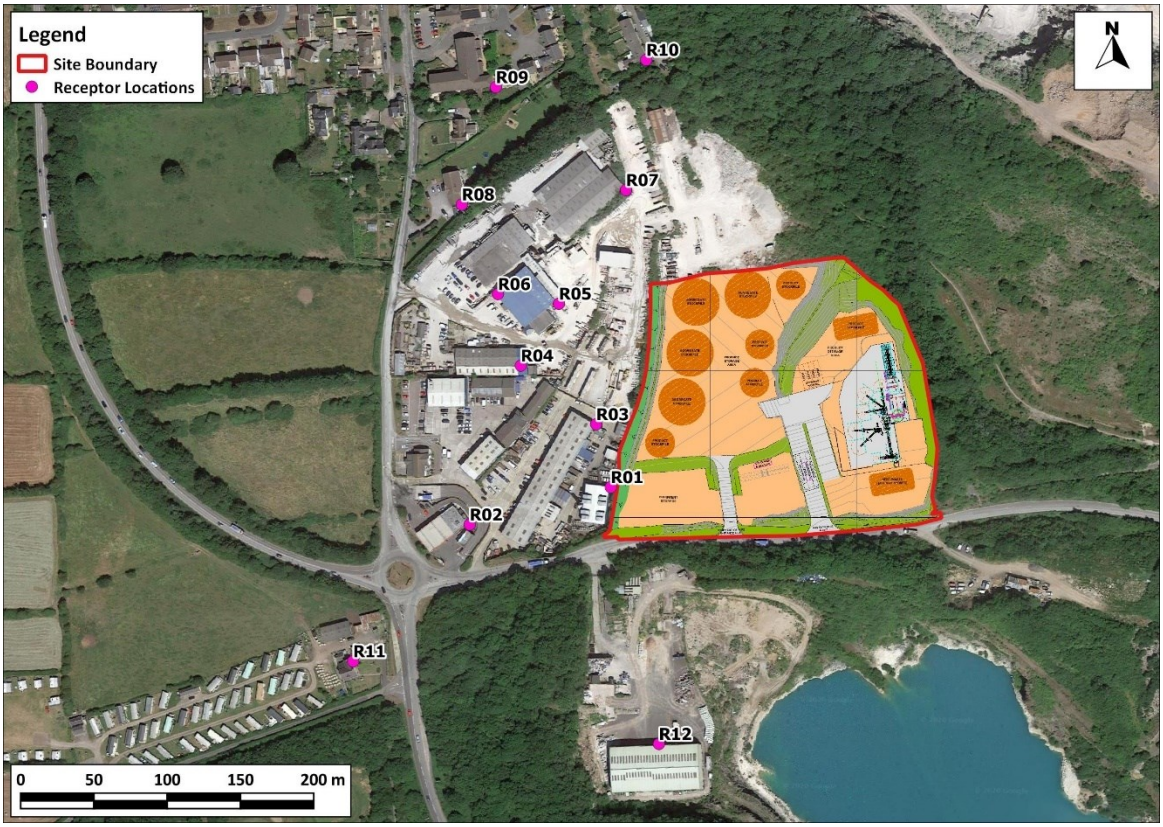

Figure 2: Receptor Locations

Imagery ©2020 Bluesky, Infoterra Ltd & COWI A.S, Getmapping plc, Maxar Technologies, The GeoInformation Group. Contains Technia Environment and Planning Ltd drawing no 11060 - 000 – C.

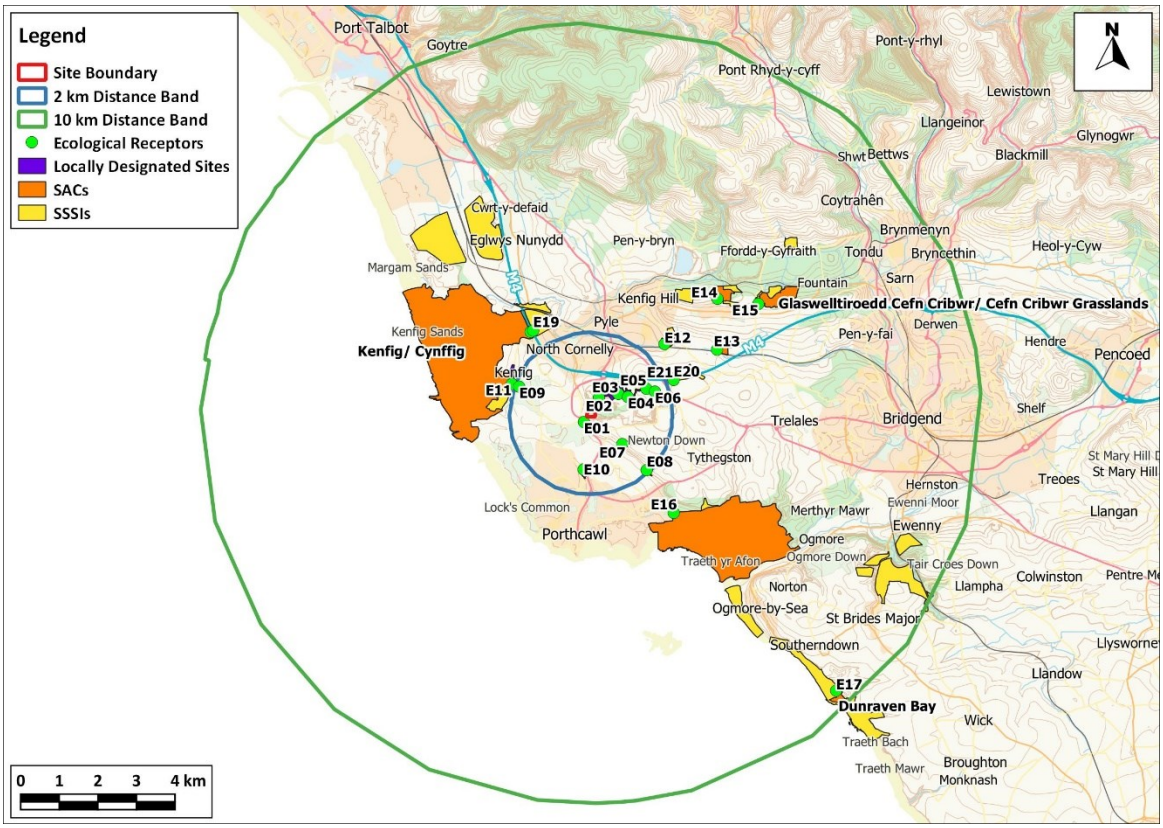

Figure 3: Ecological Receptor Locations and Ecological Sites within 2 km and 10 km Distance Bands from the Site Boundary

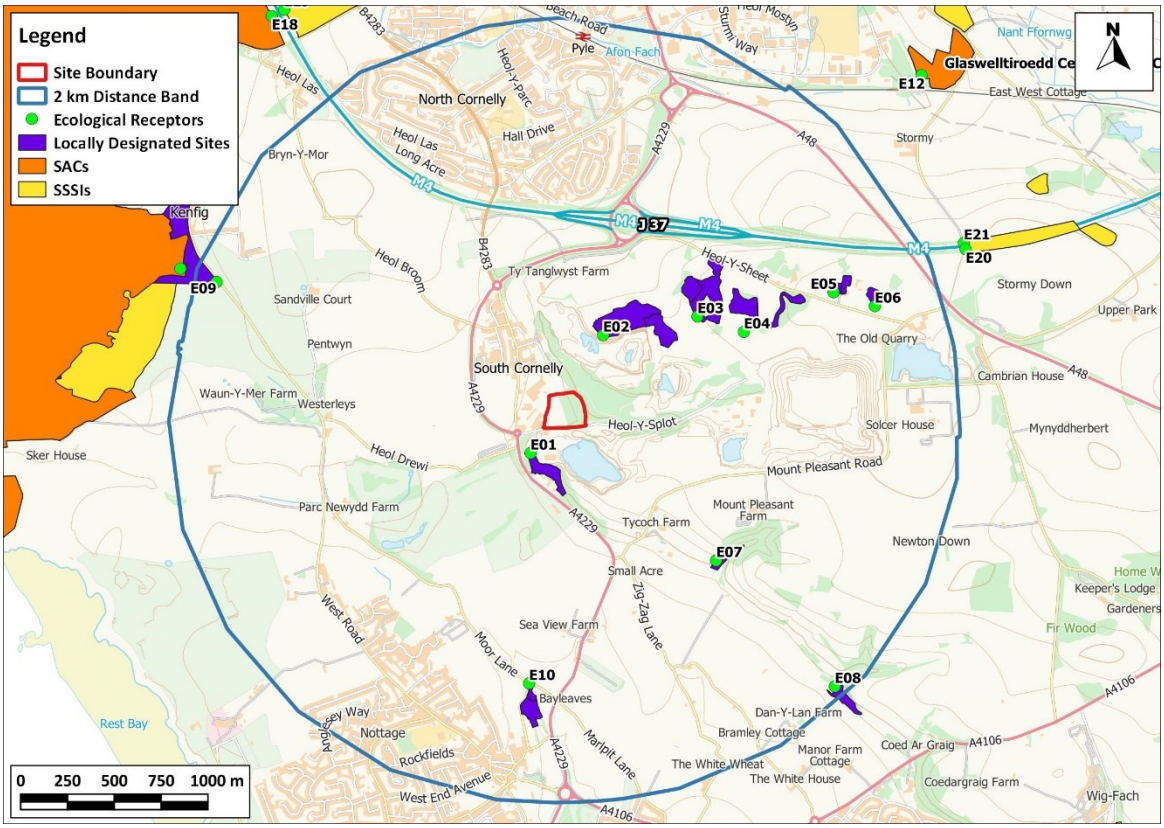

Figure 4: Ecological Receptor Locations and Ecological Sites within 2 km Distance Band from the Site Boundary

4.7 Impacts have also been predicted over a 10 km x 10 km model domain, with the proposed development at the centre. Concentrations have been predicted across this area using nested Cartesian grids (see Figure 5). These grids have a spacing of 5 m x 5 m within 200 m of the Facility, 25 m x 25 m within 400 m, 50 m x 50 m within 1,000 m, 250 m x 250 m within 2,000 m, and 500 m x 500 m within 5,000 m of the Facility. The receptor grid has been modelled at a height of 1.5 m above ground level.

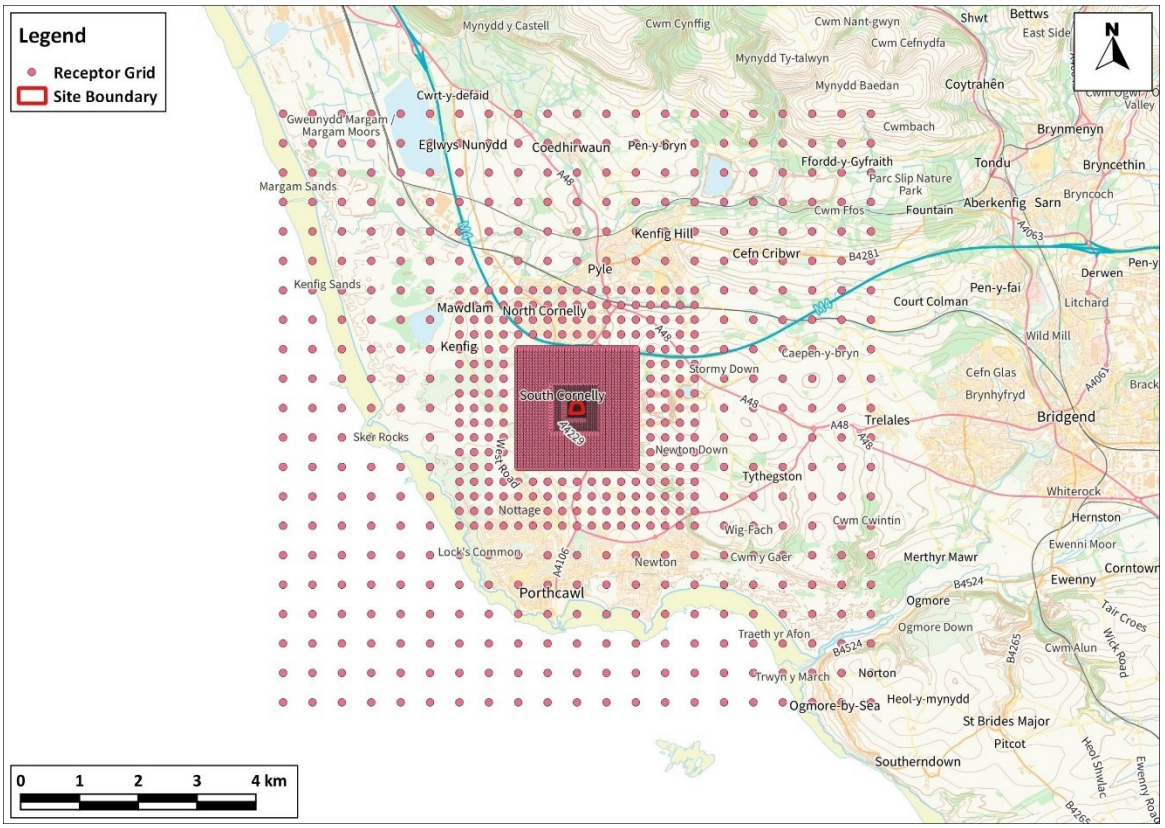

Figure 5: Nested Cartesian Grids of Receptors

4.8 The construction dust risk assessment approach does not require specific receptors to be identified; instead, the numbers of different types of receptors within given distance bands are counted. These receptor counts are provided in Section 6.

4.9 Locations sensitive to dust emitted during site operations are places where members of the public are regularly present. The sensitivity of a location will be dependent on the land use, the frequency and length of time members of the public would be present there, and the expected level of amenity in each given location.

4.10 The residential receptors close to the Facility are considered highly sensitive to the effects of dust soiling. Guidance on defining receptor sensitivity is provided in Appendix A1. The human receptors described in Table 4 have been used as receptors for this assessment.

Existing Conditions

4.11 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2020a);
- local sources have been identified through information provided by BCBC's Shared Regulatory Services Team;
- information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. This covers nearby sites to provide context for the assessment;
- background concentrations have been defined using Defra's 2018-based background maps (Defra, 2020b). These cover the whole of the UK on a 1x1 km grid. The background annual mean nitrogen oxides and nitrogen dioxide maps for 2019 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2020a). The calibration factor calculated has also been applied to future year backgrounds. Mapped background concentrations of PM_{10} and $PM_{2.5}$ have not been adjusted;
- background nitrogen deposition fluxes to the ecological sites have been taken from the APIS website (APIS, 2020) and represent 3-year averages for the period 2016-2018; and
- whether or not there are any exceedances of the annual mean EU limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra (2020c; 2020d). These maps are used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to EU data quality standards to report exceedances of the limit value to the EU. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2020d), which are available for the years 2009 to 2018, show no exceedances of the limit values anywhere in the UK in 2018.

Construction Impacts

4.12 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles. The assessment methodology is that provided by IAQM (2016a). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix A1 explains the approach in more detail.

Operational Dust Impacts

4.13 The dust risk assessment for both suspended and disamenity dust follows the approach set out in the IAQM Guidance on the 'Assessment of Mineral Dust Impacts for Planning' (IAQM, 2016b) described in Appendix A1. The proposed Facility will process construction aggregate, thus the approach for operational dust from sand and gravel extraction is considered the most appropriate for this assessment; therefore, the potential for impacts within 250 m of the site boundary has been considered. The assessment of dust emissions is undertaken in a qualitative manner, founded on a risk-based approach considering Source-Pathway-Receptor; the IAQM does not recommend a quantitative approach given the lack of accurate emissions data.

Suspended Dust Assessment Approach

4.14 The assessment of suspended dust effects includes the following steps:

- determine the existing background ambient concentrations of PM_{10}. If baseline concentrations are below 17 µg/m^3 then the impacts of the site on annual mean PM_{10} concentrations can be screened out and no further assessment is required;
- estimate the expected process contribution (PC) of PM_{10} at sensitive receptors;
- estimate the total predicted environmental concentrations (PEC) by adding the PC and background PM_{10} concentrations;
- compare the PEC with the annual mean objective for PM_{10}; and
- determine the overall PM_{10} impact on the surrounding area.

4.15 The assessment of suspended particulate matter focuses on the annual mean PM_{10} concentration, as recommended by the IAQM guidance:

"There may be a number of days per year with particularly intense operations which increase the number of days with concentrations greater than 50 µg/m^3 but do not have a significant impact on annual mean concentrations (…) the IAQM recommends the focus in assessment should be on the annual mean objective."

Disamenity Dust Assessment Approach

4.16 The primary potential impact from disamenity dust is annoyance due to dust deposited on surfaces. The assessment of disamenity dust includes three principal steps:

- Step 1 – describe the site characteristics and baseline conditions. This may involve a visit to site, a review of the existing site processes, and identification of sensitive receptors;
- Step 2 – estimate dust impact risk. This takes into account the proposed activities, potential sources of dust, the types handled, the size of the site, the duration and frequency of the

activities, the likely effectiveness of the mitigation by design, and the meteorological conditions; and

- Step 3 – estimate the likely magnitude of effect. The dust impact risk is compared with the sensitivity of the receptor, to derive the likely magnitude of effect.

4.17 The assessment of dust impact risk (Step 2) and likely magnitude of effect (Step 3) is based on the concept that, in order for a dust impact (such as annoyance or nuisance) to occur, there must be a source of dust, a pathway to transport the dust to an off-site location, and a receptor (e.g. people) to be affected by the dust (i.e. Source-Pathway-Receptor).

4.18 The key factors that will influence the impacts of dusts are the magnitude of the dust sources, the effectiveness of the pathway for transporting dusts, and the sensitivity of the receptor. The methodology set out in the IAQM guidance document describes in detail the Source-Pathway-Receptor approach to dust risk assessment, and includes tables and matrices to assist in determining the likely risk of dust effects. It includes an element of professional judgement and the experience of the consultants preparing the report is set out in Appendix A4.

Road Traffic Impacts

Screening

4.19 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 3.12 and detailed further in Appendix A3. Where impacts can be screened out there is no need to progress to a more detailed assessment.

4.20 The contribution from road traffic and diesel generator emissions (in combination) at the ecological sites has been assessed against the screening criteria set out in Paragraph 3.20. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Modelling Methodology

4.21 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v10.1) (Defra, 2021a). Details of the model inputs and the model verification are provided in Appendix A5.

4.22 Deposition fluxes have been calculated from the predicted concentrations of nitrogen dioxide. Details on the method for calculating the deposition are provided in Appendix A5.

Assessment Scenarios

4.23 Nitrogen dioxide emissions from the development-generated traffic have been predicted for the proposed year of opening of the Facility (2021).

Uncertainty

4.24 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

4.25 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A5). It has not been possible to verify the traffic model with local measurements, thus an adjustment factor calculated based on verification factors from several 2019 studies has been applied to the model results (see Appendix A5).

4.26 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on projections provided by Defra as to what will happen to vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the most recent versions of Defra's EFT carried out by AQC (2020b) (2020c) suggest that, on balance, these versions are unlikely to over-state the rate at which NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NOx concentrations are most likely to decline more quickly in the future, on average, than predicted by the current EFT, especially against a base year of 2016 or later. Using EFT v10.1 for future-year forecasts in this report thus provides a robust assessment.

Assumptions

4.27 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:

- the assumption that the proposed development is complete and fully operational in 2021;
- that the St. Athan meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A5); and
- that all light vehicle development-related traffic (LDVs) will have the same distribution as the HDV traffic.

Impacts of the Proposed Diesel Generator and Recycling Plant

4.28 The recycling plant within the Facility will be powered using a diesel generator to be located close to the eastern boundary of the site. The assumed specification for this generator, upon which the assessment is based, is set out in Appendices A5 and A6. The aggregate recycling plant will be located adjacent to the generator. Details of the emissions parameters used to assess the impacts of the recycling plant are provided in Appendix A5.

Screening

4.29 Impacts of both the diesel generator and recycling plant have been considered in combination within this assessment. The first step in considering the generator and recycling plant impacts has been to screen the pollutant emissions against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraphs 3.15 and 3.16. Where impacts cannot be screened out against these criteria, a further stage of screening is required, whereby the modelled contributions of the generator and recycling plant are compared to further screening criteria, as described in Paragraphs 3.17 to 3.19. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of the generator and recycling plant emissions, which has been required for this project.

Emissions Data

4.30 The emissions data input into the model for the diesel generator have been estimated based on specifications provided by Technia Environment and Planning Ltd, and based upon the fuel consumption, fuel composition, typical operating conditions and combustion chemistry. Emissions data for the recycling plant have been estimated based on the anticipated mass of aggregate to be processed per year, and using published emission rates for crushed stone processing and pulverised mineral processing (US Environmental Protection Agency, 2004). Further details of the emissions data used in this assessment are provided in Appendix A5. The diesel generator may be required to meet the emissions limits set out in the MCPD, as described in Paragraph 2.4.

Modelling Methodology

4.31 The impacts of emissions from the proposed diesel generator and recycling plant have been modelled using the ADMS-5 dispersion model. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model input parameters are set out in Appendix A5. The air quality modelling has been carried out based on a number of necessary assumptions, detailed further in Paragraph 4.36 and in Appendices A5 and A6. Where possible a realistic worst-case approach has been adopted.

4.32 Deposition fluxes have been calculated from the predicted concentrations of nitrogen dioxide. Details on the method for calculating the deposition rates are provided in Appendix A5.

Assessment Scenarios

4.33 Nitrogen dioxide concentrations as a result of emissions from the diesel generator, and PM_{10} concentrations as a result of the generator and recycling plant have been predicted for the year 2019 (to represent a worst-case assessment) using five years of meteorological data; 2015, 2016, 2017, 2018 and 2019. The maximum predicted concentration from any of the meteorological years has been used throughout this assessment.

Impact Description

The modelled contributions of the diesel generator and recycling plant have been combined to account for the total change in concentrations as a result of the operation of the Facility. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table 5 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 5: Air Quality Impact Descriptors for Individual Receptors for All Pollutants [a]

Long-Term Average Concentration At Receptor In Assessment Year [b]	Change in concentration relative to AQAL [c]				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

[a] Values are rounded to the nearest whole number.

[b] This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

[c] AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

Uncertainty

4.34 The dispersion model used in the assessment is dependent upon emission rates, flow rates, exhaust temperatures and other parameters for each source, all of which in reality are variable as the plant

will operate at different loads at different times. The actual generator to be installed within the development will also not be confirmed until the proposed development is definitely going ahead, and thus could be different to that assumed for this assessment. The assessment has, however, addressed this by applying worst-case assumptions where necessary, and provided that the actual generator installed adheres to the restrictions set out in Appendix A6, the conclusions of this assessment will remain valid.

4.35 There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms. These uncertainties cannot be easily quantified and it is not possible to verify the point/volume-source model outputs. Sensitivity tests have also been applied to address specific uncertainties and to ensure a worst-case assessment.

Assumptions

4.36 The following assumptions have been made in carrying out the generator and recycling plant emissions modelling, with the assumptions generally seeking to reflect a realistic worst-case scenario:

- that the diesel generator will be installed, and the Facility will be fully operational in the year 2021;
- that the diesel generator and recycling plant will operate with a constant emission rate for all operating hours (3,380 hours per year); and
- the assessment has assumed that a 500 kVA diesel generator will be installed, when in reality the final specifications of the generator are not known at this stage. This uncertainty has been addressed by providing a set of restrictions in Appendix A6 that should be adhered in order to ensure that the final plant design does not lead to impacts greater than those modelled.

Assessment of Significance

Construction Dust Significance

4.37 Guidance from IAQM (2016a) is that, with appropriate mitigation in place, the effects of construction dust will be ‘not significant’. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be ‘not significant’.

Disamenity Dust Significance

4.38 In the absence of formal criteria, the significance of the impacts has been judged based on professional experience of the consultants preparing the report, and taking account of the IAQM Guidance on the ‘Assessment of Mineral Dust Impacts for Planning’ (IAQM, 2016b). This includes defining impact descriptors at individual receptors, which take account of the dust generation

potential of the sources and the distance and direction of receptors from these sources. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the approach are provided in Appendix A1. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A4.

Diesel Generator, Recycling Plant and Road Traffic Significance

4.39 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the report is set out in Appendix A4. Full details of the EPUK/IAQM approach are provided in Appendix A3.

5 Baseline Conditions

Relevant Features

5.1 The proposed development is located approximately 8 km west of Bridgend and 850 m to the south of Junction 37 of the M4 in South Cornelly. The site is bounded by Heol-y-Splot to the south and the South Cornelly industrial estate to the west. There are a number of industrial activities in the area, including a recycling centre and a concrete batching plant and quarries to the east of the site. There are existing residential properties in South Cornelly to the northwest of the site, and a holiday park to the southwest on the other side of the A4229.

Local Air Quality Monitoring

5.2 BCBC operates two automatic monitoring stations within its area, one of which measures nitrogen dioxide concentrations; however, this monitor is not in proximity to the proposed development. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Socotec UK Ltd Didcot (using the 50% TEA in water method). These include two in Porthcawl, approximately 2.8 km south of the proposed development. Annual mean results for the years 2018 to 2019 are summarised in Table 6. The monitoring locations are shown in Figure 6. The monitoring data been taken from BCBC's 2020 Annual Progress Report (Bridgend County Borough Council, 2020).

Table 6: Summary of Annual Mean NO_2 Monitoring (2018-2019) ($\mu g/m^3$)

Site No.	Site Type	Location	2018	2019
OBC-119	Roadside	48 New Road, Porthcawl	12.5	12.4
OBC-120	Kerbside	105 New Road. Porthcawl	15.1	16.0
Objective			**40**	

Figure 6: Monitoring Locations and Site Boundary

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5.3 There have been no exceedances of the annual mean nitrogen dioxide objective measured in 2018 or 2019 in Porthcawl and concentrations are well below the objective. The diffusion tube locations are representative of the majority of the residential homes in South Cornelly, being located away from main roads, where nitrogen dioxide concentrations can be expected to be close to background concentrations.

5.4 The CM1 roadside automatic monitor, located adjacent to the Ewenny Cross roundabout in Bridgend, is located approximately 8.4 km east west of the proposed Facility. This monitor measured PM_{10} concentrations until 2018. Annual mean results for the years 2016 and 2018 are summarised in Table 7, while results relating to the daily mean objective are summarised in Table 8. All of the measured concentrations are below the objectives. Monitoring data have been taken from BCBC's 2019 Annual Progress Report (Bridgend County Borough Council, 2020).

Table 7: Summary of Annual Mean PM_{10} Monitoring (2016-2018) (µg/m^3) [a]

Site No.	Site Type	Location	2016	2017	2018
CM1	Roadside	Ewenny Cross Roundabout	15.2	-	10.1 [b]
Objective			**40**		

[a] Data have been annualised where valid data capture for the full calendar year is less than 75%.

[b] Very low data capture (44.1%).

Table 8: Number of Days with PM_{10} Concentrations Above 50 µg/m^3

Site No.	Site Type	Location	2016	2017	2018
CM1	Roadside	Ewenny Cross Roundabout	2 (24.7)	-	1 (19.2)
Objective			**35 (50) [a]**		

[a] Values in brackets are 90.4th percentiles, which are presented where data capture is <85%.

Meteorological Conditions

5.5 Meteorological conditions are an important factor influencing the dispersion of dust. High wind speeds increase the potential for dust to become airborne and rainfall acts as a natural dust suppressant. High-risk meteorological conditions arise when the wind is blowing from the dust source towards a receptor at sufficient strength (moderate breeze >5 m/s) and during periods of little or no rainfall (taken as <0.2 mm/day) (IAQM, 2016b). It is therefore considered that where wind speeds are less than 5 m/s, there is a relatively low risk of dust impacts, unless the receptors are very close (<30 m) to a source of dust.

Wind Speed and Direction

5.6 The pattern of winds averaged over five years is displayed in Figure 7, with the data taken from the meteorological station in St. Athan, located approximately 21 km to the southeast of the site. This demonstrates that the prevailing wind direction is from the west, and thus the proposed Facility will be upwind of the nearby quarry and concrete batching plant, and downwind of the industrial estate, under typical meteorological conditions.

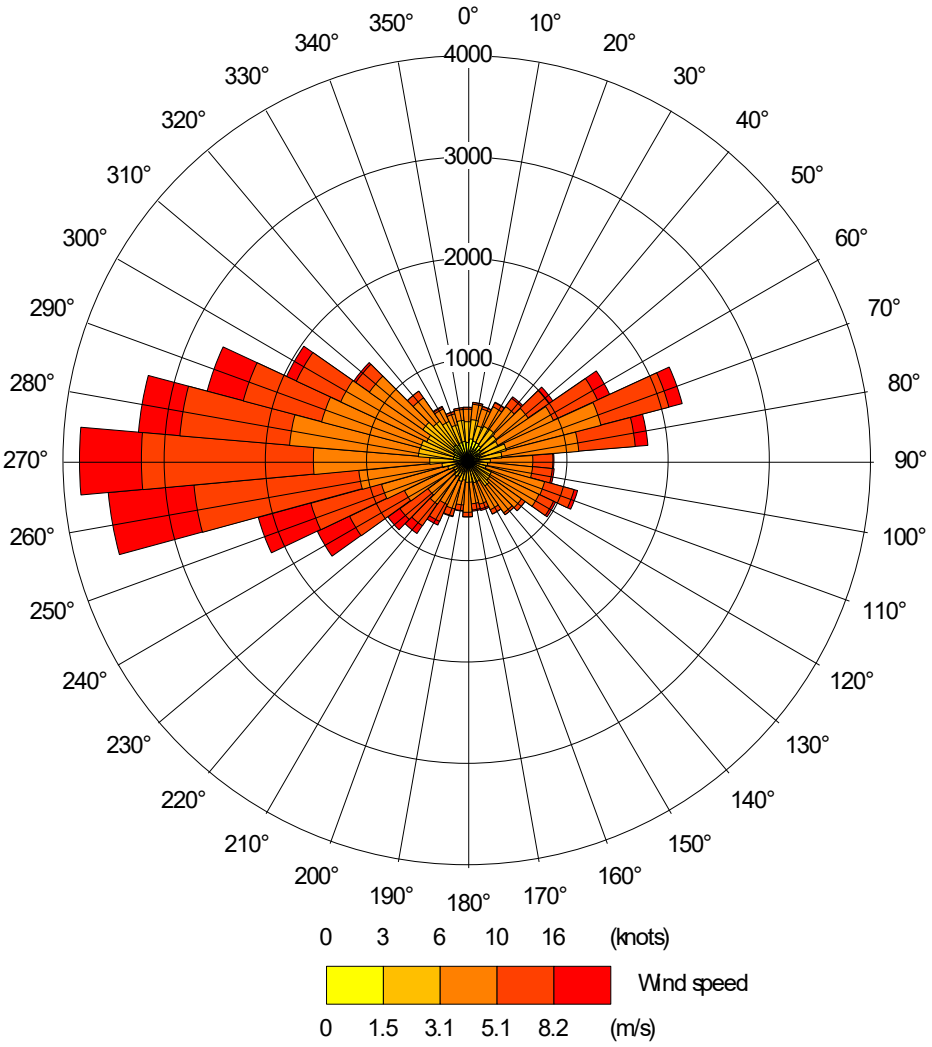

Figure 7: Wind Rose for St. Athan for the Years 2015-2019 (inclusive)

Rainfall

5.7 The historic average number of days with rainfall ≥1 mm/day is 145 days per year within this area, and therefore dust would be naturally suppressed for at least 40% of the days in the year (Met Office, 2020).

Existing Baseline Dust Levels

5.8 In the absence of local PM_{10} monitoring by BCBC, the existing baseline dust levels at the proposed development are best described by the Defra mapped background PM_{10} concentration set out in Table 9. This background concentration is likely to include the contribution of dust from the extant

industrial and quarrying works adjacent to the proposed Facility, the M4 motorway to the north, and from wind-blown sea salt.

Exceedances of EU Limit Value

5.9 There are no AURN monitoring sites within the study area with which to identify exceedances of the annual mean nitrogen dioxide limit value. Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2020c), which are used to report exceedances of the limit value to the EU, do not identify any exceedances within the study area in 2018. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational (noting that limit value exceedances are assessed differently to objective exceedances).

Background Concentrations and Fluxes

National Background Pollution Maps

5.10 Estimated background concentrations in the study area are set out in Table 9 and are all well below the objectives. A range of values is presented as the study area covers multiple 1x1 km grid squares.

Table 9: Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2021 (µg/m^3)

Year	NOx	NO_2	PM_{10}	$PM_{2.5}$
2019	6.2 – 22.1	4.6 – 15.4	9.5 – 14.6	6.1 – 9.1
2021	5.7 – 19.6	4.3 – 13.9	9.2 – 14.2	5.9 – 8.8
Objectives	**-**	**40**	**40**	**25** [a]

[a] The $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Background Deposition and Acidity

5.11 Background nitrogen deposition fluxes to the designated ecological sites are presented in Table 10. Background nutrient nitrogen deposition rates exceeded the critical loads in this period at all of the ecological sites, except at Drunraven Bay SAC.

Table 10: Estimated Annual Mean Background Nitrogen Deposition

Receptor	Ecological Site	Nutrient Nitrogen Deposition (kgN/ha/yr)	Acid Nitrogen Deposition (keq/ha/yr)
E01	Ancient Woodland	16.1	1.15
E02	Ancient Woodland	19.9	1.42
E03	Ancient Woodland	19.9	1.42
E04	Ancient Woodland	19.9	1.42
E05	Ancient Woodland	19.9	1.42
E06	Ancient Woodland	19.9	1.42
E07	Ancient Woodland	16.1	1.15
E08	Ancient Woodland	16.1	1.15
E09	Kenfig Pool and Dunes National Nature Reserve	12.3	0.88
E10	Ancient Woodland	16.1	1.15
E11	Kenfig / Cynffig SAC	12.2	0.87
E12	Glaswelltiroedd Cefn Cribwr/ Cefn Cribwr Grasslands SAC	13.2	0.94
E13	Glaswelltiroedd Cefn Cribwr/ Cefn Cribwr Grasslands SAC	13.2	0.94
E14	Glaswelltiroedd Cefn Cribwr/ Cefn Cribwr Grasslands SAC	13.2	0.94
E15	Glaswelltiroedd Cefn Cribwr/ Cefn Cribwr Grasslands SAC	13.2	0.94
E16	Kenfig / Cynffig SAC	12.2	0.87
E17	Dunraven Bay SAC	8.7	0.60
E18	Kenfig / Cynffig SAC	12.2	0.87
E19	Cynffig / Kenfig SSSI	12.2	0.87
E20	Stormy Down SSSI	19.9	1.42
E21	Stormy Down SSSI	19.9	1.42
Critical Load		**8 - 10**	**1.011 – 11.217**

6 Construction Phase Impact Assessment

Construction Traffic

6.1 It is anticipated that the construction phase will generate an average of five HGV movements per working day, thus the additional movements on local roads will be well below the 100 AADT screening criterion recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase.

On-Site Exhaust Emissions

6.2 The IAQM guidance (IAQM, 2016a) states:

"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur".

6.3 NRMM and site traffic will operate more than 100 m away from any sensitive receptors that are relevant to the air quality objectives. It is judged that there no risk of significant effects at existing receptors as a result of on-site machinery emissions.

Construction Dust and Particulate Matter Emissions

6.4 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A1), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

6.5 There is no requirement for demolition on site.

Earthworks

6.6 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2020), as set out in Table 11. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 11: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Shallow
Soil Parent Material Grain Size	Mixed (Argillaceous [a] – Arenaceous [b])
European Soil Bureau Description	Limestone
Soil Group	Medium (Silty) to Light (Silty) to Heavy
Soil Texture	Clayey Loam [c] to Silty Loam

[a] grain size < 0.06 mm.

[b] grain size 0.06 – 2.0 mm.

[c] a loam is composed mostly of sand and silt.

6.7 The site covers some 35,250 m^2 and most of this will be subject to earthworks, involving excavation and transfer of material to create bunds on the eastern and western boundaries of the site, levelling of the site and installation of drainage systems. Approximately 17,950 tonnes of material will be moved, and the height of the bunds will be a maximum of 8 m (including 4 m height added to the existing bunds). There will be a maximum of five earth moving vehicles active at any one time.

6.8 The earthworks will last around 12 – 13 weeks and dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table A2.1 in Appendix A1, the dust emission class for earthworks is considered to be *medium*.

Construction

6.9 Construction will involve containerised buildings only. Based on the example definitions set out in Table A2.1 in Appendix A1, the dust emission class for construction is considered to be *small*.

Trackout

6.10 It is anticipated that the number of heavy vehicles accessing the site, which may track out dust and dirt, will be approximately two to three per day. Based on the example definitions set out in Table A2.1 in Appendix A1, the dust emission class for trackout is considered to be *small*.

6.11 Table 12 summarises the dust emission magnitude for the proposed development.

Table 12: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Earthworks	Medium
Construction	Small
Trackout	Small

Sensitivity of the Area

6.12 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

6.13 The IAQM guidance explains that residential properties are 'high' sensitivity receptors to dust soiling, while cafés and places of work within the industrial estate would be 'medium' sensitivity receptors (Table A2.2 in Appendix A1). The guidance notes that "*people's expectations* [of the level of amenity] *will vary depending on the dust deposition in the area*"; there are already a number of large-scale dust-generating activities in the area (i.e. quarry operations, concrete batching etc.). There are no residential properties within 100 m of the site, while there are two cafés and a number of industrial units (see Figure 8).

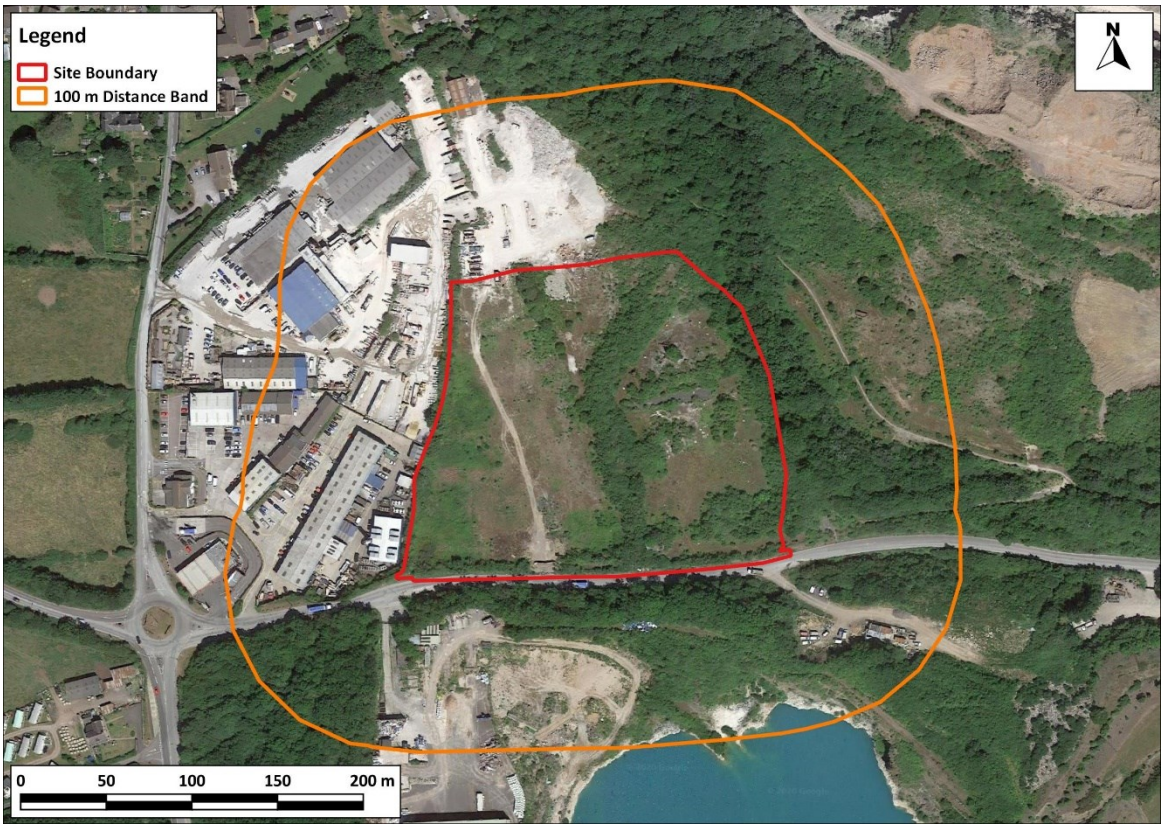

Figure 8: 100 m Distance Band around Site Boundary

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6.14 Table 12 shows that the dust emission magnitude for trackout is *small* and Table A2.3 in Appendix A1 thus explains that there is a risk of material being tracked 50 m from the site exits. There is one STOR facility and part of a waste recycling facility within 50 m of the roads along which material could be tracked (see Figure 9).

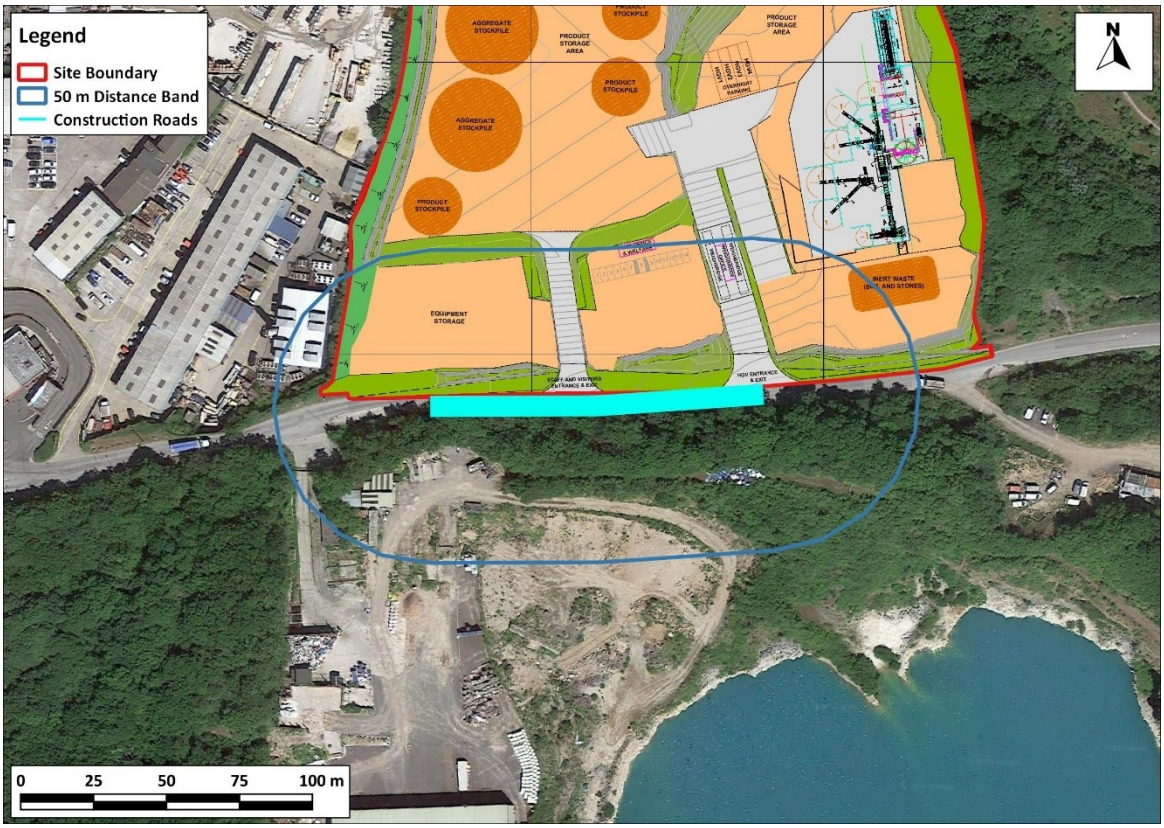

Figure 9: 50 m Distance Bands around Roads Used by Construction Traffic Within 50 m of the Site Exits

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Sensitivity of the Area to Effects from Dust Soiling

6.15 Using the information set out in Paragraph 6.13 and Figure 8 alongside the matrix set out in Table A2.3 in Appendix A1, the area surrounding the onsite works is of 'low' sensitivity to dust soiling. Using the information set out in Paragraph 6.14 and Figure 9 alongside the same matrix, the area is also of 'low' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

6.16 The matrix in Table A2.4 in Appendix A1 requires information on the baseline annual mean PM_{10} concentration in the area. The properties and cafés nearest the site are set well back from the main road, and the existing annual mean PM_{10} concentration is best described by the range of background concentrations described in Paragraph 7.23 (10.7 – 13.4 µg/m^3). Using the information set out in Paragraphs 6.13 and Figure 8, alongside the matrix in Table A2.4 in Appendix A1, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 6.14 and Figure 9 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

6.17 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

6.18 Table 13 summarises the sensitivity of the area around the proposed construction works.

Table 13: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	Low Sensitivity	Low Sensitivity
Human Health	Low Sensitivity	Low Sensitivity

Risk and Significance

6.19 The dust emission magnitudes in Table 12 have been combined with the sensitivities of the area in Table 13 using the matrix in Table A2.6 in Appendix A1, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 14. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 9 (step 3 of the assessment procedure).

Table 14: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Earthworks	Low Risk	Low Risk
Construction	Negligible	Negligible
Trackout	Negligible	Negligible

6.20 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016a).

7 Mineral Dust Risk Assessment

Operation of the Facility

7.1 The Facility will receive up to 200,000 tonnes of inert demolition and construction waste per annum. The construction waste will be crushed and passed by conveyor to the recycling plant, where it will be washed and screened into different sizes. The processed aggregates will then fall into storage bins below the recycling plant. The recycling plant water will be filtered to remove solid material, which will be used to produce a clay that can be used in construction, and the water will be recirculated to the recycling plant.

7.2 The Facility will operate between the hours of 7am and 7pm Monday to Friday, and 8am to 1pm on Saturdays. The Facility will not operate on Sundays or bank holidays.

Screening for Disamenity Dust

7.3 The closest high sensitivity receptors to potential sources of dust within the Facility are residential properties located approximately 150 m to the north and northwest of the aggregate stockpiles. There are a number of non-residential human receptors within the industrial estate to the west of the Facility; the closest medium sensitivity receptor within the industrial estate is an industrial unit, approximately 50 m from the nearest aggregate stockpile. There is a Short-Term Operating Reserve (STOR) site located 35 m to the southwest of a product stockpile, and a recycling facility, which is considered as a low sensitivity receptor, approximately 200 m south of a product stockpile.

7.4 The IAQM guidance (IAQM, 2016b) states that a disamenity dust impact assessment is required where sensitive locations are located within 250 m of a sand and gravel extraction site (which is considered to be the most representative site type for this facility considered within the guidance); therefore, an assessment of dust is required for the proposed development. Figure 10 shows the site plan for the Facility and the distances to nearby sensitive receptors from the closest dust emitting areas of the site (aggregate stockpiles). The Figure also indicates the sensitivity of the receptors, as set out in the IAQM guidance (IAQM, 2016b).

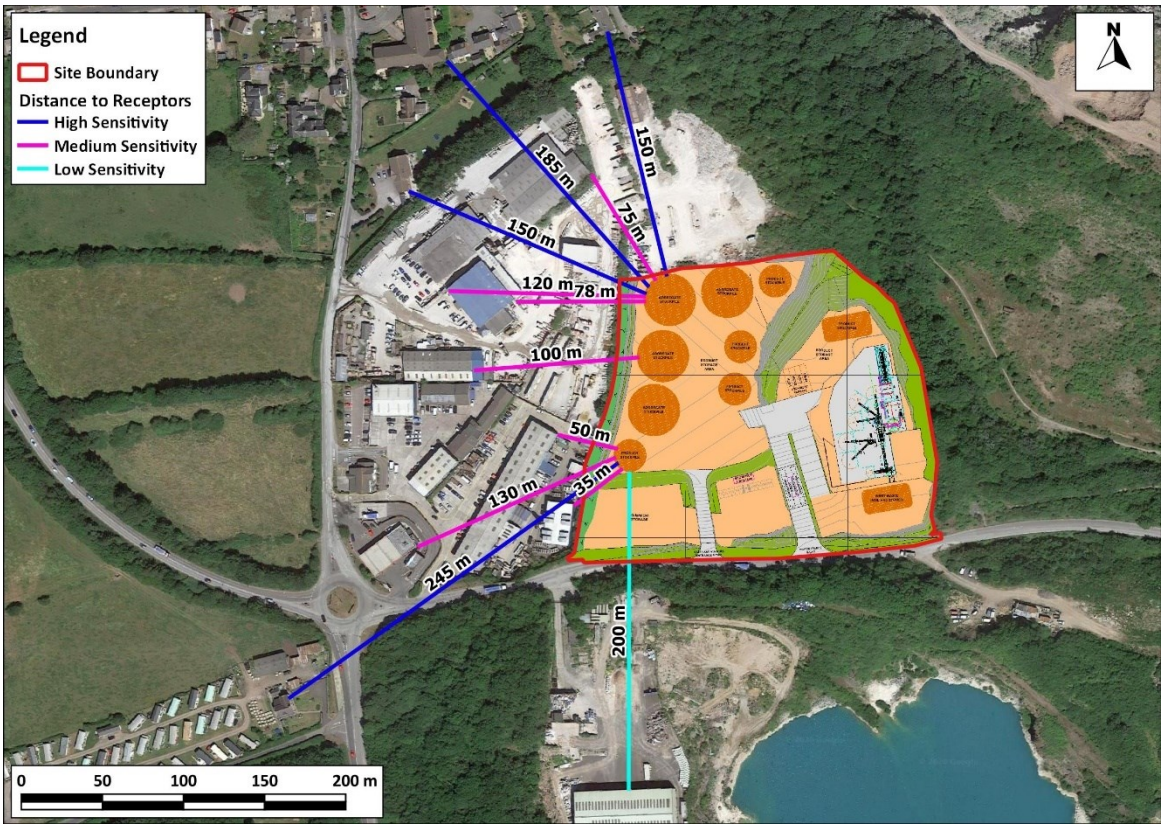

Figure 10: Site Plan and Distances to Sensitive Receptors from Onsite Stockpiles

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Disamenity Dust Risk Assessment

7.5 The risk of dust impacts at existing sensitive receptors as a result of emissions from the operations of the Facility depends on a number of factors, including the frequency of exposure, distance to operations, the activities undertaken, material handled, dust control measures implemented and the physical terrain and features.

7.6 The approach to the disamenity dust risk assessment considers the residual source emissions (the potential sources of dust taking into account the designed-in mitigation measures), pathway effectiveness and receptor sensitivity to determine an overall magnitude of effect in accordance with the methodology detailed in Appendix A1.

Residual Source Emissions

7.7 The potential sources of dust from the operation of the site are as follows (IAQM, 2016b):

- site preparation/restoration;
- materials handling;

- on-site transportation;
- processing;
- stockpiles/exposed surfaces; and
- off-site transportation.

7.8 A description of each of the activities to be undertaken at the Facility is set out below. The information has been provided by Technia Environment and Planning Ltd.

Site Preparation / Restoration

7.9 In the first 1 – 2 weeks the earthworks will involve the creation of site entrances, bunds and surfaced tracks. In weeks 3 – 6, the site will be graded and topsoil will be excavated to create bunds along the site boundaries. A drainage system will be installed during weeks 7 – 8. Further excavation work will be undertaken in weeks 7 – 11 to flatten the eastern part of the site, then the remaining hardstanding creation, equipment installation and construction of storage bays will take place from weeks 12 – 19.

Processing

7.10 The construction waste will be crushed and passed by conveyor to the recycling plant, where it will be washed and screened into different sizes. Crushing will be done in the far south east of the site, away from residential, commercial and industrial receptors. The processed aggregates will fall into storage bays below the recycling plant. The recycling plant water will be filtered to remove solid material, which will be used to produce a clay that can be used in construction, and the water will be recirculated to the recycling plant. The filter cake will then be stored in covered storage bay. Water sprays will be used to reduce dust generation. As a wet process, there will be little opportunity for dust generation and fugitive dust emissions. Water sprays will be used on unsurfaced areas when required. A twice daily site inspection will be carried out to identify any operational activities resulting in abnormal levels of dust generation.

Material Handling

7.11 Aggregate will be washed, significantly reducing its potential to generate dust. The tipping area will be located in the far south east of the site, away from residential and commercial receptors. Water sprays used to minimise dust generation.

On-site Transportation

7.12 Internal access roads will be surfaced with asphalt or concrete, and the remainder of site will be compacted stone hardstand.

Stockpiles / Exposed Surfaces

7.13 Aggregate products will be stockpiled in the north-eastern section of the site, and to the north of the recycling plant. Inert waste will be piled to the south of the recycling plant. Aggregate will be washed to produce a higher quality product, which will reduce dust emission from the stockpiles.

Off-site Transportation

7.14 The finished product will be transported offsite via HGV. A wheel wash will be installed if mud is identified as being tracked off-site. Heavy Goods Vehicle (HGV) loads arriving to and departing from the site will be sheeted to prevent fugitive emissions.

7.15 Overall, considering the potential dust emissions sources at the Facility - which are not explicitly included within the construction dust risk assessment or the modelling undertaken in this assessment (i.e. materials handling, stockpiles, tipping and on-site/off-site transport) - the overall source dust potential for the operations at the Facility is considered to be **low**.

Pathway Effectiveness

7.16 The majority of particles responsible for nuisance are deposited within 100 m – 200 m of the source, and it is in this zone that the risk of problems from dust is greatest. Coarse dusts (for example greater than 30 µm in diameter) will largely deposit within 100 m of the source (IAQM, 2016b).

7.17 For all sources, the creation and subsequent dispersion of dust will be highly dependent on the weather conditions. Wind speed can determine the amount of dust entrained in the air, while wind direction determines those areas that may be affected. Higher wind speeds increase the potential for the generation of airborne dust due to the suspension and entrainment of particles in airflow; rainfall however, has a suppressive effect on the generation of dust.

7.18 In order to address the effectiveness of the pathway, it is important to consider receptors in terms of their proximity to dust sources and the prevalence of wind directions that would place them downwind of the sources. Based on the proposed site layout (see Figure 7), an assessment of the closest receptors within 250 m of site operations in all directions has been undertaken.

7.19 A wind rose for the site is presented in Figure 7. All of the nearby residential properties are located to the north-northwest and southwest of the Facility, and the industrial estate is located to the west of the Facility. Thus, none the closest receptors will be downwind of the operations under typical (westerly prevailing winds) meteorological conditions. The effectiveness of the pathways between the Facility and the sensitive receptors within the proposed development are summarised in Table 15.

Table 15: Effectiveness of Dust Pathway

Receptor	Distance from Source (m) [a]	Categorisation of Receptor Distance from Source	Direction from Source (°)	Frequency of Potentially Dusty Winds		Pathway Effectiveness
				% towards the receptor, when speed >5m/s on Dry Days	Frequency Category	
R01	35	Close	30 - 95	0.9	Infrequent	Ineffective
R02	130	Intermediate	45 - 80	0.7	Infrequent	Ineffective
R03	50	Close	35 - 125	1.3	Infrequent	Ineffective
R04	100	Intermediate	60 - 120	1.1	Infrequent	Ineffective
R05	78	Close	75 - 150	1.1	Infrequent	Ineffective
R06	120	Intermediate	80 - 140	0.9	Infrequent	Ineffective
R07	75	Close	125 - 185	0.5	Infrequent	Ineffective
R08	150	Intermediate	115 - 145	0.6	Infrequent	Ineffective
R09	185	Intermediate	125 - 160	0.4	Infrequent	Ineffective
R10	150	Intermediate	140 - 190	0.3	Infrequent	Ineffective
R11	245	Distant	40 - 70	0.5	Infrequent	Ineffective
R12	200	Distant	360 - 45	0.2	Infrequent	Ineffective

[a] Distance to closest potential source of dust (aggregate stockpiles).

7.20 The pathway effectiveness is judged to be *ineffective* for all receptors. Winds from the dust source to all receptors are infrequent and the effectiveness of the pathways are deemed ineffective, regardless of the distance between the source and the receptor.

Potential Dust Effects

7.21 The potential dust effects at the sensitive receptors are presented in Table 16. This brings together the residual source emission potential (Paragraph 7.15), the pathway effectiveness from Table 15, the risk of dust impact (which is pathway effectiveness combined with the residual source potential) and the receptor sensitivities, using the criteria described in Appendix A1, to identify the likely dust effect at each receptor.

Table 16: Assessment of Potential Dust Effects

Receptor	Risk of Dust Effects			Receptor Sensitivity	Likely Dust Effect
	Source Dust Potential	Effectiveness of Pathway	Risk of Dust Impact		
R01	Small	Ineffective	Negligible	Medium	Negligible
R02	Small	Ineffective	Negligible	Medium	Negligible
R03	Small	Ineffective	Negligible	Medium	Negligible
R04	Small	Ineffective	Negligible	Medium	Negligible
R05	Small	Ineffective	Negligible	Medium	Negligible
R06	Small	Ineffective	Negligible	Medium	Negligible
R07	Small	Ineffective	Negligible	Medium	Negligible
R08	Small	Ineffective	Negligible	High	Negligible
R09	Small	Ineffective	Negligible	High	Negligible
R10	Small	Ineffective	Negligible	High	Negligible
R11	Small	Ineffective	Negligible	High	Negligible
R12	Small	Ineffective	Negligible	Low	Negligible

7.22 The potential dust effects for all receptors are summarised in the final column of Table 16. The dust effects are predicted to be *negligible* at all receptors.

Suspended Dust (Human Health) Risk Assessment

7.23 The assessment of the impact of suspended dust requires the existing background PM_{10} concentrations to be taken into account. The range of background concentrations for human receptors in 2019 is 10.7 – 13.4 µg/m^3 (see Table 9), which is below the objective, and also below the screening criterion for a detailed suspended dust assessment (17 µg/m^3). Therefore, the impact of suspended dust on existing receptors can be screened out as *negligible* and is 'not significant'.

8 Operational Phase Impact Assessment

Human Health

Assessment of Development-Generated Road Traffic Emissions

8.1 The proposed development is expected to generate a daily average of 16 light vehicle trips and between 56 and 111 HGV trips. Approximately 10% of the HGVs will travel along the A4229 to the south of the Facility, and 90% will use the A4229 to the north, of which 60% will travel on the M4 east of J39 and 40% will use the M4 west of J39. It is anticipated that 10% of the HGVs using the M4 west of J39 will exit/enter the motorway at J38 at Neath Port Talbot and 30% will travel through the Neath Port Talbot AQMA. Thus, Annual Average Daily Traffic (AADT) flows will increase by 50 – 100 HGVs on the A4229 north of the Facility, which does not exceed the screening threshold of 100 HDVs recommended for use outside of an AQMA in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Paragraph 3.13). AADT flows will increase by 18 – 36 HGVs through the Neath Port Talbot AQMA. While the maximum of this range exceeds the screening threshold of 25 HDVs recommended for use within an AQMA, the guidance states that *"the presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate"*. The Neath Port Talbot AQMA is declared for the 24-hour mean PM_{10} objective, and there is a minimum distance of 20 m between the edge of the main carriageway and nearest sensitive receptors. The local pollutant monitoring within the AQMA has measured concentrations below the 24-hour mean PM_{10} objective for a number of years (Neath Port Talbot County Borough Council, 2019). As such, it is judged that the impact of the additional HGVs along the M4 on PM_{10} concentrations in the Neath Port Talbot AQMA will be *negligible*, and there is no requirement for a detailed assessment of road traffic impacts at existing receptors.

Assessment of Diesel Generator and Recycling Plant Emissions

8.2 The maximum predicted nitrogen dioxide and PM_{10} contributions at existing receptors associated with emissions from the diesel generator and recycling plant are shown in Table 17. For the annual mean averaging periods, the maximum predicted concentrations at the residential receptors are provided. For the short-term averaging periods, the maximum predicted concentrations at the residential and café/takeaway receptors are provided. The maximum concentrations from any of the five meteorological years considered have been presented.

Table 17: Predicted Maximum Pollutant Concentrations associated with Diesel Generator and Recycling Plant Emissions (µg/m³)

Pollutant/Averaging Period	Maximum Process Contribution		Objective
	µg/m³	% of Objective	
Annual Mean NO_2	0.11	0.29	**40**
99.79th %ile of 1-hour NO_2	2.73	1.37	**200**
Annual Mean PM_{10}	0.26	0.65	**40**
90.4th %ile of 24-hour PM_{10}	1.35	2.70	**50**

8.3 These predicted maximum concentrations can be compared with the EPUK/IAQM screening criteria, as previously described in Section 3, and the following conclusions can be drawn:

- the predicted maximum annual mean nitrogen dioxide concentration (0.29% of the objective) is below the screening criterion (0.5%);
- the predicted maximum 99.79th percentile of 1-hour mean nitrogen dioxide concentrations (1.37% of the objective) is well below the screening criterion (10%);
- the predicted maximum annual mean PM_{10} concentration (0.65% of the objective) is above the screening criterion (0.5%); and
- the predicted maximum 90.4th percentile of 24-hour mean PM_{10} concentrations (2.70% of the objective) is well below the screening criterion (10%).

8.4 The predicted impacts exceed the screening criterion for annual mean PM_{10} concentrations, and thus require further detailed assessment. No further assessment is required for the annual and 1-hour mean nitrogen dioxide or 24-hour mean PM_{10} concentrations.

Contour Plots

8.5 A contour plot of the nitrogen dioxide short term process contribution at ground level (1.5 m) has been generated for information and is shown in Figure A5.1 in Appendix A5. Relevant locations for the short-term objective are locations where members of the public are likely to regularly spend one hour or more. As shown in Figure A5.1, there are no locations relevant to the short-term objective where the 10% screening criterion (20 µg/m³) is exceeded.

Detailed Assessment of Diesel Generator and Recycling Plant Emissions at Specific Residential Receptors

8.6 The predicted annual mean PM_{10} concentrations at each existing receptor where the annual mean PM_{10} objective applies, including emissions from the proposed diesel generator and recycling plant, are shown in Table 18. The receptors at which the objective applies are limited to those with residential land use. In the absence of local monitoring, the Defra mapped background concentration at each receptor for 2019 (see Table 9) is assumed as the baseline concentration. Concentrations

have been calculated following the methodology set out in Section 4 and in Appendix A5. All of the residential receptors are set well back from main roads; thus, it is not considered necessary to explicitly include emissions from road traffic.

Table 18: Predicted Annual Mean Concentrations of PM_{10} in 2019 at Residential Receptors ($\mu g/m^3$)

Receptor	Baseline	"With Generator and Recycling Plant"	% Change [a]	Impact Descriptor
R08	13.4	13.6	1	Negligible
R09	13.4	13.6	0	Negligible
R10	13.4	13.6	1	Negligible
R11	10.7	10.9	1	Negligible
Objective	**40**	**-**	**-**	

[a] % changes are relative to the objective and have been rounded to the nearest whole number.

8.7 The annual mean PM_{10} concentrations are well below the objective at all residential receptors. The percentage changes in PM_{10} concentrations, relative to the air quality objective (when rounded), are predicted to be 1% at three of the receptors and 0% at one of the receptors. Using the matrix in Table 5, these impacts are described as *negligible*.

Ecosystem

8.8 At the specific request of BCBC, the impacts of emissions from the operational traffic generated by the proposed development have been modelled, and are presented in combination with the diesel generator emissions below. Receptors E18, E19, E20 and E21 were not included in the original assessment of the diesel generator undertaken before comments were received from BCBC. Thus, the modelled diesel generator process contributions at the closest relevant receptor locations have been assumed to apply at receptors E18 – E21 (receptors E11 used for E18 and E19, and receptor E06 used for E20 and E21, respectively), to provide a worst-case assessment.

Combined Assessment of Traffic and Diesel Generator Emissions

8.9 The predicted nitrogen oxide concentrations and rates of nutrient and acid nitrogen deposition associated with emissions from the development traffic and diesel generator are shown in Table 19. The process contributions shown are the maximum at any of the ecological receptors (see Table 4, Figure 3 and Figure 4) and correspond to the maximum % of EAL in each case.

Table 19: Predicted Maximum Pollutant Concentrations associated with Traffic and Diesel Generator Emissions

Pollutant/Averaging Period	Maximum Process Contribution	% of EAL	Screening Criterion (% of EAL)
Annual Mean Nitrogen Oxides (µg/m^3)	0.14	0.46	1 - 100%
24-Hour Mean Nitrogen Oxides (µg/m^3)	2.31	3.08	10 - 100%
Annual Mean Nutrient Nitrogen Deposition Rate (kg-N/ha/yr)	0.03	0.28	1 - 100%
Annual Mean Acid Nitrogen Deposition Rate (keq/ha/yr)	<0.01	0.02	1 - 100%

8.10 These predicted maximum concentrations can be compared with the screening criteria recommended by the Environment Agency, as previously described in Section 2, and the following conclusions can be drawn:

- the predicted maxima annual mean nitrogen oxides concentration (0.46% of the objective) is below the minimum screening criterion (1%);
- the predicted maximum 24-hour mean nitrogen oxides concentrations (3.08% of the critical level) is well below the minimum screening criterion (10%);
- the predicted maximum annual mean nutrient nitrogen deposition rate (0.28% of the critical load) is well below the minimum screening criterion (1%); and
- the predicted maximum annual mean acid nitrogen deposition rate (0.02% of the critical load) is well below the minimum screening criterion (1%).

8.11 The results shown in Table 19 are the worst-case results for any of the ecological receptor locations, and correspond to Receptor E01 (see Figure 4). The process contributions at all other ecological receptor locations are lower, and well below 1% or 10% of the relevant critical levels and loads.

8.12 None of the screening criteria are exceeded at any of the nearby ecological sites. The potential for significant impacts at ecological receptors as a result of emissions from the Facility can thus be discounted.

Contour Plots

8.13 There are two Sites of Importance for Nature Conservation (SINCs) within 1 km of the proposed development site boundary which have not been explicitly included in the modelling undertaken for this assessment (Cornelly Quarry and Grove Common) (Wildwood Ecology, 2020). It is understood that a portion of the eastern boundary of the proposed development site is located within the Cornelly Quarry SINC, but the extent of the SINC is not currently known. The area is, however, covered by the grid of receptors. A contour plot of the annual mean and short-term NOx process contributions from the diesel generator has been generated for information and is shown in Figure A5.4 in

Appendix A5. The figure shows that there are no locations outside of the proposed development site boundary where the annual mean NOx process contribution exceeds the 100% screening criterion (30 µg/m^3), and that the short-term process contribution will only exceed the 100% screening criterion (75 µg/m^3) at a small area outside of the eastern boundary of the site. Thus, it is considered that the overall air quality effects on the nearby ecological sites is 'not significant'.

Significance of Operational Air Quality Effects

8.14 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A3, and takes account of the assessment that pollutant concentrations at all of the selected worst-case existing receptors close to the Facility be well below the air quality objectives, and all of the impacts are predicted to be *negligible*.

9 Mitigation

Good Design and Best Practice

9.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The proposed development incorporates the following good design and best practice measures, which have been accounted for in the assessment as far as is possible:

- adoption of a Dust Management Plan (DMP) or Construction Environmental Management Plan (CEMP) to minimise the environmental impacts of the construction works;
- scheme design such that the dustiest activities and the diesel generator will be located towards the eastern boundary of the site, furthest from sensitive receptors;
- creation of 8 m high bunds along the site boundaries; and
- a series of measures will be implemented to reduce the risk of dust emission during operation of the Facility, including:
    - HGV loads will be sheeted to prevent emission of dust from aggregate during transport;
    - internal access roads will be hard surfaced, and compacted stone hardstand will cover the remainder of the site;
    - a wheel wash will be installed if mud is identified as being tracked offsite,
    - water sprays will be used to reduce dust generation during crushing, and on unsurfaced areas when required; and
    - aggregate will be washed before storage.

Recommended Mitigation

Construction Impacts

9.2 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.

9.3 The site has been identified as a *Low* Risk site during earthworks and *Negligible* Risk during construction and for trackout, as set out in Table 14. Comprehensive guidance has been published by IAQM (2016a) that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction (IAQM, 2018). This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment,

to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A7.

9.4 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Disamenity and Suspended Dust Impacts

9.5 The assessment has demonstrated that the disamenity dust effects are predicted to be *negligible* at all receptors, and that the impact of suspended dust on existing receptors can be screened out as *negligible* and is 'not significant'. As such, it is not considered necessary to recommend mitigation beyond the best practice design measures highlighted above.

Road Traffic Impacts

9.6 The assessment has demonstrated that the proposed development will not cause any exceedances of the air quality objectives and that the overall effect of the proposed development will be 'not significant'. Furthermore, the impacts of development-generated traffic emissions on all nearby sensitive ecological sites will be 'not significant'. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

9.7 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). The Council's Air Quality Action Plan will also be helping to deliver improved air quality.

Diesel Generator and Recycling Plant Impacts

9.8 The assessment has demonstrated that the emissions from the diesel generator and recycling plant within the proposed development will have an insignificant impact on air quality at existing nearby properties. As such, there is no requirement for mitigation beyond the best practice design measures highlighted above. The diesel generator installed within the development should, however, meet the specifications set out in Appendix A6; if the installed plant does not conform to these specifications, additional assessment and/or mitigation may be required.

10 Residual Impacts

Construction Impacts

10.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out in Section 9 and Appendix A7 are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

10.2 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be 'not significant'.

Disamenity and Suspended Dust Impacts

10.3 With the good design and best practice mitigation measures detailed in Paragraph 9.1 in place and effectively implemented, the residual effects are judged to be 'not significant'.

11 Conclusions

11.1 The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction and operation, emissions from road traffic generated by the operational development, and emissions from the diesel generator installed to power the recycling plant.

Construction Impacts

11.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.

Operational Impacts

Impacts

11.3 The assessment has demonstrated that pollutant concentrations will be well below the objectives at all existing receptors in 2021, and that the emissions from the additional traffic generated by the proposed development, the diesel generator within the development, and the operation of the Facility itself, will have a *negligible* impact on air quality conditions at all nearby existing receptors.

Mitigation

11.4 It is not considered necessary to recommend mitigation beyond the best practice design measures incorporated into the design and operation of the Facility.

Significance

11.5 The overall operational air quality effects of the proposed development are judged to be 'not significant'. This conclusion is based on the concentrations at existing receptors being well below the objectives and impacts of the proposed diesel generator and recycling plant all being *negligible*, the likely disamenity dust effects at existing receptors all being *negligible*, and impacts of suspended dust on existing receptors being *negligible*.

Policy Implications

11.6 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 180 of the NPPF, being appropriate for its location in terms of its effects on the local air quality environment. It is also consistent with Paragraph 181, as it will not affect compliance with relevant limit values or national objectives. The proposed development is also consistent with

Strategic Polices SP4 and ENV7 of BCBC's Local Development Plan, as it will not have a significant detrimental effect on the quality of its natural resources, and it will not "*cause a new, or exacerbate an existing, unacceptable risk of harm to health, biodiversity and/or local amenity*" due to air pollution.

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13 Glossary

AADT	Annual Average Daily Traffic
ADMS-5	Atmospheric Dispersion Modelling System model for point sources
APIS	Air Pollution Information System
AQC	Air Quality Consultants
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
BCBC	Bridgend County Borough Council
CEMP	Construction Environmental Management Plan
CHP	Combined Heat and Power
CROW	Countryside and Rights of Way Act
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
EU	European Union
EUNIS	European Nature Information System
EV	Electric Vehicle
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
kph	Kilometres Per hour
kW	Kilowatt

LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LTP	Local Transport Plan
µg/m^3	Microgrammes per cubic metre
MCPD	Medium Combustion Plant Directive
MW$_{th}$	Megawatts Thermal
NO	Nitric oxide
NO$_2$	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO$_2$ + NO)
NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PC	Process Contribution
PEC	Predicted Environmental Concentration
PM$_{10}$	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM$_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPW	Planning Policy Wales
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
STOR	Short Term Operating Reserve
TAN	Technical Advice Note
TEA	Triethanolamine – used to absorb nitrogen dioxide
WHO	World Health Organisation

14 Appendices

A1 Mineral Dust Assessment Procedure

A1.1 The guidance developed by the IAQM on the Assessment of Mineral Dust Impacts for Planning (IAQM, 2016b), provides criteria to screen the need for a detailed assessment, and if required, a suggested approach to the detailed assessment of mineral developments.

Screening Assessment

A1.2 The guidance sets out screening criteria that can be used to determine whether a detailed air quality assessment is required.

A1.3 If there are no relevant receptors within 1 km of the operations, then a detailed dust assessment can be screened out. In such a case, it is considered that irrespective of the nature, size and operation of the site, the risk of an impact is likely to be 'negligible' and any resulting effects are likely to be 'not significant'.

A1.4 In cases whereby receptors are located between 400 m, or 250 m (depending on the rock type) and 1 km of operations, it would normally be assumed that a detailed disamenity dust impact assessment is not required. However, the decision on whether to assess should be made and justified on a site-specific basis by a suitably experienced air quality professional taking into account local factors.

A1.5 If there are relevant human and / or ecological receptors within 250 m or 400 m (depending on the rock type), a disamenity dust impact assessment will almost always be required. This step is deliberately chosen to be conservative (and will in practice result in assessments being required for most minerals development schemes).

Detailed Assessment

A1.6 If a detailed assessment is required the guidance describes the assessment approach in three steps, which are described in detail in the sections below.

Table A1.1: Detailed Assessment Steps

Step	Action	Consideration
Step 1	Describe Site Characteristics and Baseline Conditions	Such as extent of site boundary, operations, mineral type, production rate, working method, scale and duration of works, consideration of existing baseline conditions and dust sources
Step 2	Estimate Dust Risk	Consideration of pathway effectiveness and residual source emissions
Step 3	Estimate Likely Magnitude of Effect	Consideration of dust impact risk and receptor sensitivity

Step 2

Determination of Residual Source Emissions

A1.7 The residual source emission is determined considering site characteristics and the potential for emissions from each source, taking in account designed in mitigation measures.

A1.8 As stated within the guidance the following factors should be considered:

- the activities being undertaken (blasting, crushing, screening, methods of handling and storage etc.);
- the types and properties of the materials involved;
- the size of the site and, specifically, the area of land being worked (and hence the quantities of materials involved and the number of vehicles and plant etc.);
- the durations and frequencies of the activities;
- the likely effectiveness of the dust control measures incorporated into the design of the submitted development scheme, including design features, management controls (ideally formalised within a Dust Management Plan) and, where appropriate, engineering controls;
- other mitigation measures applied to reduce or eliminate dust; and
- the meteorological conditions that can promote or inhibit the raising of dust at the source (high winds and rainfall, respectively).

A1.9 The guidance provides examples illustrating factors that need to be considered when making a professional judgement as to the residual source emissions.

Table A1.2: Factors to Consider When Determining Residual Source Emissions

Source Activity	Factor Consideration
Site Preparation/Restoration	Size of working area
	Height of bunds
	Volume of material movement
	No. of heavy plant
	Whether bunds are seeded or sealed
	Potential of material for dust generation
Materials Handling	No. of heavy plant
	Type of surface (paved or unconsolidated)
	Distance of activities to site boundary (or in void)
	Potential of material for dust generation
On-site Transportation	Transport method (un-consolidated haul road or use of conveyors)

Source Activity	Factor Consideration
	Type of haul road (unpaved or paved)
	Dust potential of road surface
	No. of heavy vehicle movements
	Length of haul roads
	Vehicle speed (controlled or uncontrolled)
Mineral Processing	Potential of raw material for dust generation
	Potential of end product for dust generation
	Complexity of process
	Volume of material processed
Stockpiles/exposed surfaces	Length of stockpile storage
	Frequency of material transfer
	Potential of raw material for dust generation
	Type of surface (paved or unconsolidated)
	Distance of stockpiles to site boundary (or in void)
	Area of exposed surfaces
	Wind speed and dust threshold
Off-site Transportation	No. of HGV movements
	Type of access road (unpaved or paved)
	Vehicle cleaning facility provision
	Length of access road

Estimation of Pathway Effectiveness

A1.10 The effectiveness of pathway is determined based on site-specific factors considering the distance and direction of each receptor relative to the prevailing wind direction. The frequencies of wind in each direction are calculated based on meteorological data for five years from a nearby meteorological station. The frequency of exposure of receptors to moderate to high winds from the direction of the source is categorised in Table A1.3 and the distance of the receptor to source is categorised within Table A1.4. Consideration of topography and physical features is also required.

Table A1.3: Categorisation of Frequency of Potentially Dusty Winds

Frequency Category	Criteria
Infrequent	Frequency of winds (>5m/s) from the direction of the dust source on all days are less than 5%
Moderately frequent	The frequency of winds (>5m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table A1.4 Categorisation of Receptor Distance from Source

Category	Criteria
Distant	Receptor is between 200 m and 400 m from the dust source
Intermediate	Receptor is between 100 m and 200 m from the dust source
Close	Receptor is less than 100 m from the dust source

A1.11 The resulting pathway effectiveness for each receptor is identified using the criteria in Table A1.2 and Table A1.4, as shown in Table A1.5.

Table A1.5: Pathway Effectiveness

		Frequency of potentially dusty winds			
		Infrequent	**Moderately frequent**	**Frequent**	**Very frequent**
Receptor Distance Category	**Close**	Ineffective	Moderately Effective	Highly Effective	Highly Effective
	Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
	Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

A1.12 The risk ratings for residual source emissions and pathway effectiveness (for each receptor) identified using the criteria in Table A1.2 and Table A1.5 are then combined using the matrix shown in Table A1.6 to estimate an overall risk of dust impact at each specific receptor location.

Table A1.6: Estimation of Dust Impact Risk

		Residual Source Emissions		
		Small	**Medium**	**Large**
Pathway Effectiveness	**Highly effective pathway**	Low Risk	Medium Risk	High Risk
	Moderately effective pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

Step 3

A1.13 The next stage of the risk assessment is to identify the potential dust effect at each receptor location. This is done using the matrix presented in Table A1.7, which combines the overall dust impact risk descriptor for each receptor with the receptor sensitivity.

Table A1.7: Assessment of Dust Magnitude of effects

		Receptor Sensitivity		
		Low	**Medium**	**High**
Dust Impact Risk	**High Risk**	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
	Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

A1.14 As a final stage of assessment, an overall significance of dust effects is determined, based on professional judgment and taking into account the significance of effect at each specific receptor location for each activity.

A2 Construction Dust Assessment Procedure

A2.1 The criteria developed by IAQM (2016a) divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

A2.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A2.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A2.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A2.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A2.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A2.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A2.1.

Table A2.1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes
Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A2.8 The sensitivity of the area is defined taking account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters to reduce the risk of wind-blown dust.

A2.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table A2.2. These receptor sensitivities are then used in the matrices set out in Table A2.3, Table A2.4 and Table A2.5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A2.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A2.6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A2.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix A7.

STEP 4: Determine Significant Effects

A2.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

A2.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A2.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust-sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A2.3: Sensitivity of the Area to Dust Soiling Effects on People and Property [2]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

[2] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a *large* dust emission magnitude for trackout, 200 m from sites with a *medium* dust emission magnitude and 50 m from sites with a *small* dust emission magnitude, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table A2.4: Sensitivity of the Area to Human Health Effects [2]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A2.5: Sensitivity of the Area to Ecological Effects [2]

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table A2.6: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

A3 EPUK & IAQM Planning for Air Quality Guidance

A3.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

A3.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A3.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

A3.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;

- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
    - Spark ignition engine: 250 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A3.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

A3.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Impacts of the Development on the Local Area

A3.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

A3.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A3.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A3.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A3.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

A3.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

"The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

A3.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

A3.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A3.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

A3.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A3.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A3.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A4.

A4 Professional Experience

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Mr Caird is an Associate Director with AQC, with 15 years' experience in the field of air quality including the detailed assessment of emissions from road traffic, airports, heating and energy plant, and a wide range of industrial sources including the thermal treatment of waste. He has experience in ambient air quality monitoring for numerous pollutants using a wide range of techniques and is also competent in the monitoring and assessment of nuisance odours and dust. Mr Caird has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers and process operators. He is a Member of the Institute of Air Quality Management and is a Chartered Scientist.

Paul Outen, BSc (Hons) MIEnvSc MIAQM

Mr Outen is a Senior Consultant with AQC with over ten years' experience in air quality and odour assessment. He has assessed residential and commercial developments, industrial installations, road schemes, energy centres and mineral and waste facilities. These involve qualitative assessments, and quantitative modelling assessments using the ADMS dispersion models, for both planning and permitting purposes. He has also presented evidence at public hearings. Mr Outen has a particular interest in odour assessment, and has extensive experience in the assessment of odours across a wide range of industries throughout the UK, Europe and Asia. He also has experience in pollutant monitoring techniques, and played a key role in the development and standardisation of isokinetic bioaerosol sampling in the UK. He regularly undertakes site audits for various installations to advise on pollution control and mitigation strategies. He is a Member of both the Institution of Environmental Sciences and Institute of Air Quality Management.

Dr Kate Wilkins, BSc (Hons) MSc PhD MIEnvSc AMIAQM

Dr Wilkins is a Consultant with AQC, with eight years' postgraduate and work experience in the field of Environmental and Earth Sciences. Since joining AQC in January 2018, she has undertaken numerous air quality assessments for road traffic, combustion plant and construction dust, and has contributed to major projects. Previously, Kate completed a PhD at the University of Bristol, researching atmospheric dispersion modelling and satellite remote sensing of volcanic ash. Prior to her PhD she gained a BSc in Environmental Science and an MSc in Environmental Dynamics and Climatic Change. She also spent a year working at the Environment Agency in Flood Risk Management.

A5 Modelling Methodology

Road Traffic

Model Inputs

A5.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 10.1) published by Defra (2021a). Model input parameters are summarised in Table A5.1 and, where considered necessary, discussed further below.

Table A5.1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	No
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	No
Noise Barriers Modelled?	No
Meteorological Monitoring Site	St. Athan
Meteorological Data Year	2019
Dispersion Site Surface Roughness Length (m)	0.3
Dispersion Site Minimum MO Length (m)	10
Met Site Surface Roughness Length (m)	0.2
Met Site Minimum MO Length (m)	1
Gradients?	No

A5.2 AADT flows, and the proportions of HDVs for the proposed development have been calculated based on the Draft Transport Assessment Scoping Note prepared by Sanderson Associates Ltd (Sanderson Associated Ltd, 2020), and additional information provided by Technia Environment and Planning Ltd. The traffic data used in this assessment are summarised in Table A5.2. Diurnal flow profiles for the traffic assume uniform distribution of the operational traffic over the operational hours of the Facility. Only the development-generated traffic has been modelled; this is judged to be a suitable approach for predicting the increase in NOx concentrations and nitrogen deposition at the ecological sites along the affected road network.

Table A5.2: Summary of Traffic Data used in the Assessment (AADT Flows)

Road Link	2021 (Development Only)	
	AADT	%HDV
Heol-y-Splot	127	87.4
A4229 South of Heol-y-Splot	13	87.4
A4229 North of Heol-y-Splot	114	87.4
M4 East of J39	69	87.4
M4 West of J39	46	87.4
A48	5	87.4
M4 West of J38	41	87.4

A5.3 Figure A5.1 shows the road network included within the model, along with the speed at which each link was modelled.

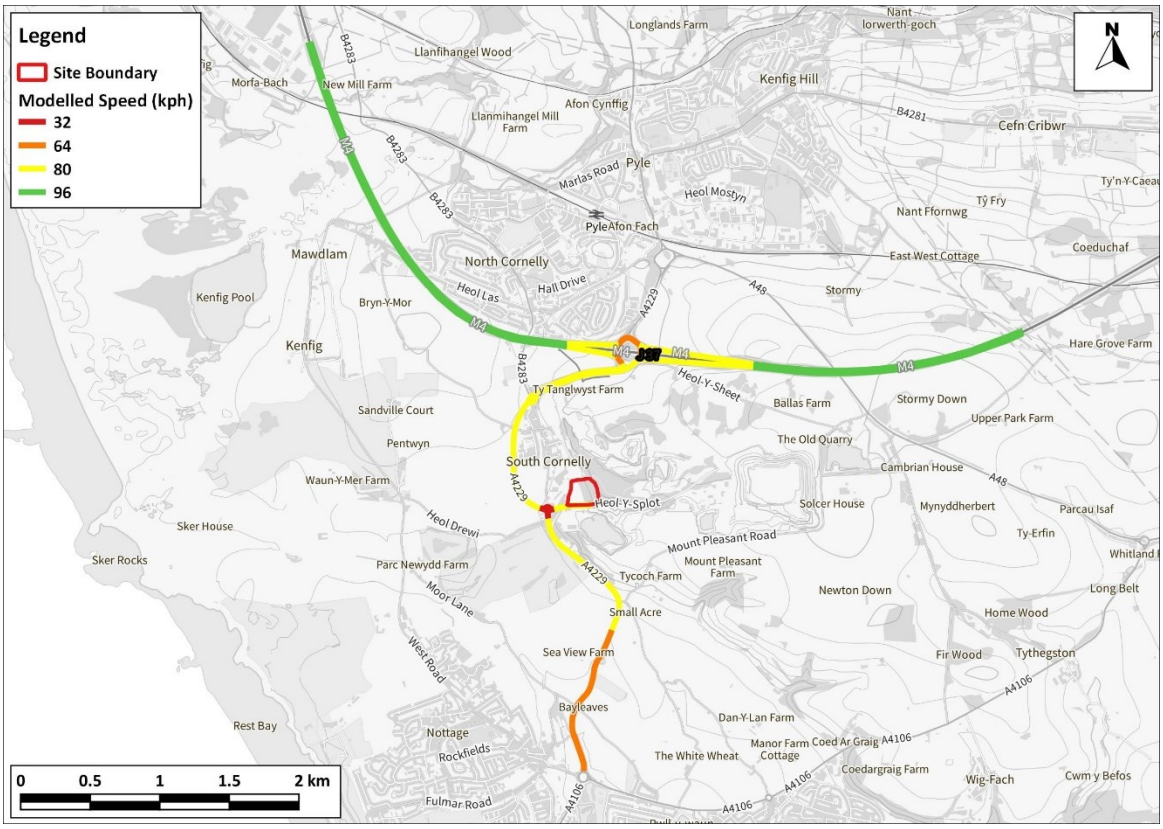

Figure A5.1: Modelled Road Network & Speed

A5.4 Hourly sequential meteorological data in sectors of 10 degrees from St. Athan for the year 2019 have been used in the model. The St. Athan meteorological monitoring station is located at St. Athan

Airfield, located approximately 21 km to the southeast of the proposed development site. It is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of the proposed development; both the application site and the St. Athan meteorological monitoring station are located at near-coastal locations on the south coast of Wales where they will be influenced by the effects of coastal meteorology. A wind rose for the site for the year 2019 is provided in Figure A5.2. The station is operated by the UK Met Office. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

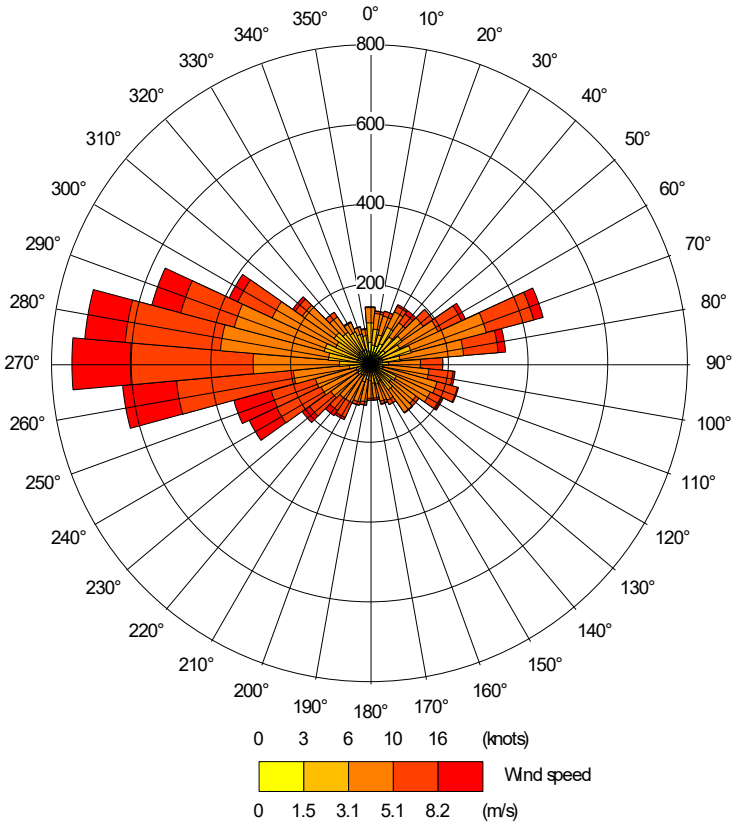

Figure A5.2: Wind Rose

Model Verification

A5.5 In order to ensure that ADMS-Roads accurately predicts local concentrations, it is necessary to verify the model against local measurements. It has not been possible to verify the model against local measurements, thus an average verification factor of **2.04** has been calculated based on several case studies throughout the UK in 2019, and this adjustment factor has been applied to the model results. This factor is considered to provide a reasonable worst-case assessment.

Diesel Generator and Recycling Plant

Point Source Parameters

A5.6 The impacts of emissions from the proposed diesel generator have been predicted using the ADMS-5 dispersion model. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model has been run to predict the contribution of the proposed generator emissions to annual mean concentrations of nitrogen oxides and PM_{10} (assumed to be both $PM_{2.5}$ and PM_{10}), the 99.79th percentile of 1-hour mean nitrogen oxides concentrations, and the 90.4th percentile of 24-hour mean PM_{10} concentrations. Model input selections are summarised in Table A5.3 and, where considered necessary, discussed further below. Input emission parameters are presented later in Table A5.5.

Table A5.3: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	Yes for human and grid receptors – 12km x 12km Cartesian grid at 50m resolution
Variable Surface Roughness File Used?	Yes for human and grid receptors – 12km x 12km Cartesian grid at 50m resolution
Urban Canopy Flow Used?	No
Building Downwash Effects Modelled?	No
Meteorological Monitoring Site	St. Athan
Meteorological Data Years	2015, 2016, 2017, 2018, 2019
Dispersion Site Surface Roughness Length (m)	0.3 for ecological receptors; variable surface roughness file used for human and grid receptors
Dispersion Site Minimum MO Length (m)	10
Met Site Surface Roughness Length (m)	0.2
Met Site Surface Minimum MO Length (m)	1

A5.7 The diesel generator plant proposed to be installed into the development will have an assumed net fuel input of 1,250 kW_{th}, which is equivalent to a fuel consumption of 126 litres per hour of diesel oil. The generator will be capable of delivering 500 kVA on demand. The generator has been assumed to comply with MCPD emissions limits, which are 190 mg/Nm^3 for NOx and 10 mg/Nm^3 for PM (assumed as PM_{10} within the model). The generator to be installed may not be required to comply with MCPD limits, and may instead comply with EU Stage IIIB limits, which are 2 mg/kWh for NOx and 0.025 mg/kWh for PM (the equivalent of 206.6 mg/Nm^3 for NOx and 2.6 mg/Nm^3 for PM at 0°C and 15% O_2). Thus, the NOx emissions modelled are comparable to the Stage IIIB emissions limits, and the PM emissions modelled are conservative compared to Stage IIIB limits.

A5.8 Emissions will exhaust from one flue. Technia Environment and Planning Ltd has advised that the backup generator plant will operate for 12 hours per day Monday to Friday, and five hours per day on Saturdays, and a diurnal profile has been used in the model to account for this usage. The

exhaust volume flow rate for the diesel generator has been calculated based on the complete combustion of the assumed diesel oil composition in Table A5.4 and the following typical values for diesel generators of this size:

- 100% load;
- 30% efficiency;
- 488 ˚C exit temperature; and
- 64% excess air in (set so that the calculated exhaust gas mass flow matches the maximum value of the range provided by Technia Environment and Planning Ltd; 75 – 94 m^3 per minute).

Table A5.4: Typical Diesel Fuel Composition

Elemental Component	Diesel Oil
Carbon	86.5%
Hydrogen	13.2%
Oxygen	0.3%
Net Calorific Value (LHV) (MJ/kg)	42.82
Gross Calorific Value (HHV) (MJ/kg)	45.70
HHV/LHV	1.07
Liquid Density @ 15°C (kg/m^3)	835

A5.9 The flue location has been provided by Technia Environment and Planning Ltd, and is shown in Figure A5.5. The flue has been modelled at a height of 2.29 m. The internal flue diameter has been adjusted to achieve an exhaust velocity of 32 m/s, which is considered reasonable for a diesel generator of this size.

A5.10 The emission parameters employed in the modelling are set out in Table A5.5. Further details of the diesel generator plant parameters are provided in Appendix A6.

Table A5.5: Plant Specifications and Modelled Emissions and Release Conditions

Parameter	Value
Calculated Net Fuel Input (kW)	1,250.0
Calculated Gross Fuel Input (kW)	1,334.1
Flue Internal Diameter (m) [a]	0.25
Specified Exhaust Mass Flow Rate (m^3/min)	75 - 94
Calculated Actual Exhaust Volume Flow (m^3/s) [b]	1.568
Calculated Exit Velocity (m/s)	31.9
Calculated Exhaust O_2 Content (%)	7.8
Calculated Exhaust H_2O Content (% v/v)	8.5

Specified Exhaust Temperature (°C)	488 – 550 [c]
Calculated Normalised Exhaust Volume Flow (Nm^3/s) [d]	1.076
Assumed NOx Emission Rate (mg/Nm^3) [d]	190
Assumed PM_{10} Emission Rate (mg/Nm^3) [d]	10
Calculated NOx Emission Rate (g/s)	0.2045
Calculated PM_{10} Emission Rate (g/s)	0.0108
Flue Location (x,y)	282330, 180095
Modelled Flue Height Above Ground (m)	2.29

Note: Orange highlighted cells contain the values entered into the model. The number of significant figures presented should not be taken to represent the accuracy of the information used.

[a] This is the internal flue diameter required to achieve an efflux velocity of 32 m/s, which is considered reasonable for a diesel generator of this size.

[b] Not normalised.

[c] An exhaust temperature of 488˚C has been used in the model.

[d] 'Normal' here refers to 15% O_2, 0˚C, 101.325 kPa and 0% H_2O.

Contours

A5.11 A contour plot of the nitrogen dioxide short-term nitrogen dioxide process contributions at ground level (1.5 m) has been generated for information and is shown in Figure A5.3. Relevant locations for the short-term objective are locations where members of the public are likely to regularly spend one hour or more. It can be seen from Figure A5.3 that there are no locations relevant to the short-term objective where the 10% screening criterion (20 $\mu g/m^3$) is exceeded.

A5.12 A contour plot of the annual mean and short-term NOx process contributions is shown in Figure A5.4. The figure shows that there are no locations outside of the proposed development site boundary where the annual mean NOx process contribution exceeds the 100% screening criterion (30 $\mu g/m^3$) for locally designated ecological sites, and that the short-term process contribution will only exceed the 100% screening criterion (75 $\mu g/m^3$) at a small area outside of the eastern boundary of the site.

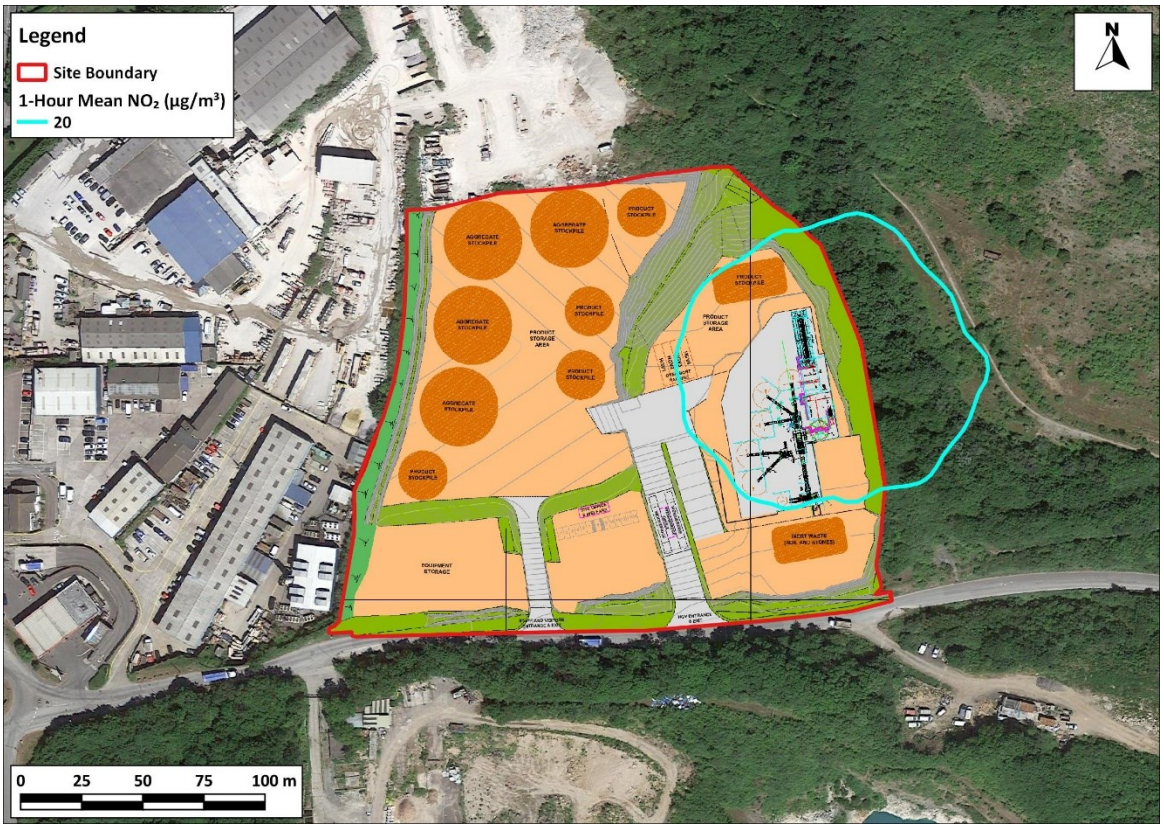

Figure A5.3: 99.79th Percentile of 1-hour Mean Process Contribution Contours from the Diesel Generator

Imagery ©2020 Bluesky, Infoterra Ltd & COWI A.S, Getmapping plc, Maxar Technologies, The GeoInformation Group. Contains Technia Environment and Planning Ltd drawing no 11060 - 000 – C.

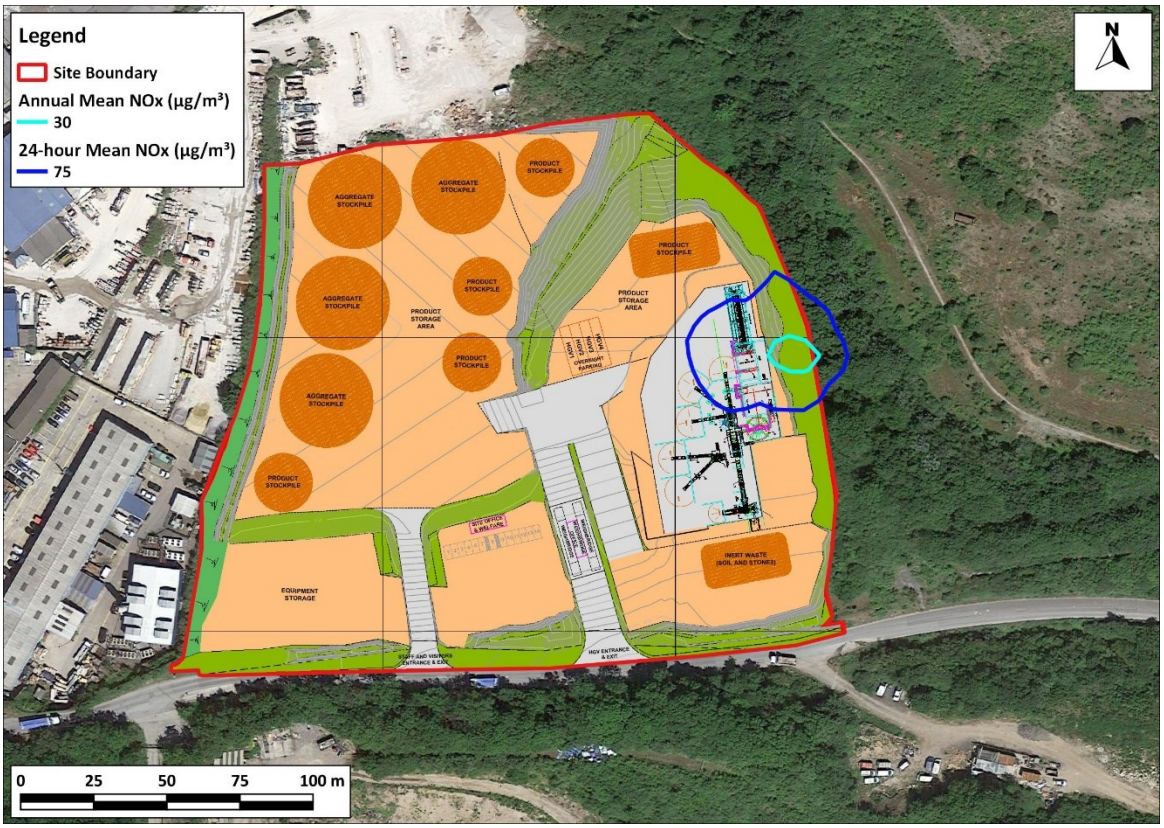

Figure A5.4: Annual Mean and 100th Percentile of 24-hour Mean NOx Process Contribution Contours from the Diesel Generator

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Volume Source Parameters

A5.13 To account for the potential for fugitive dust emissions from the aggregate recycling plant, the plant has been modelled as a volume source with an area of approximately 1,800 m^2, a height of 5 m, and a volume of approximately 9,000 m^3, using the ADMS-5 dispersion model. Technia Environment and Planning Ltd has advised that the recycling plant will operate for 12 hours per day Monday to Friday, and five hours per day on Saturdays, and a diurnal profile has been used in the model to account for this usage.

A5.14 The PM_{10} emission rate for the recycling plant has been calculated based on the operational hours, the anticipated mass of aggregate material to be processed per year (200,000 tonnes) and the emission rate for uncontrolled fines crushing published by the United States Environmental Protection Agency (2004) (0.0075 kg/tonne PM_{10}). Thus, the emission rate is calculated as 0.0000137 $g/m^3/s$. Using the uncontrolled emission rate ensures a conservative assessment as it does not account for mitigation measures in place to reduce dust emission during operation of the plant. The modelled volume source is shown in Figure A5.5.

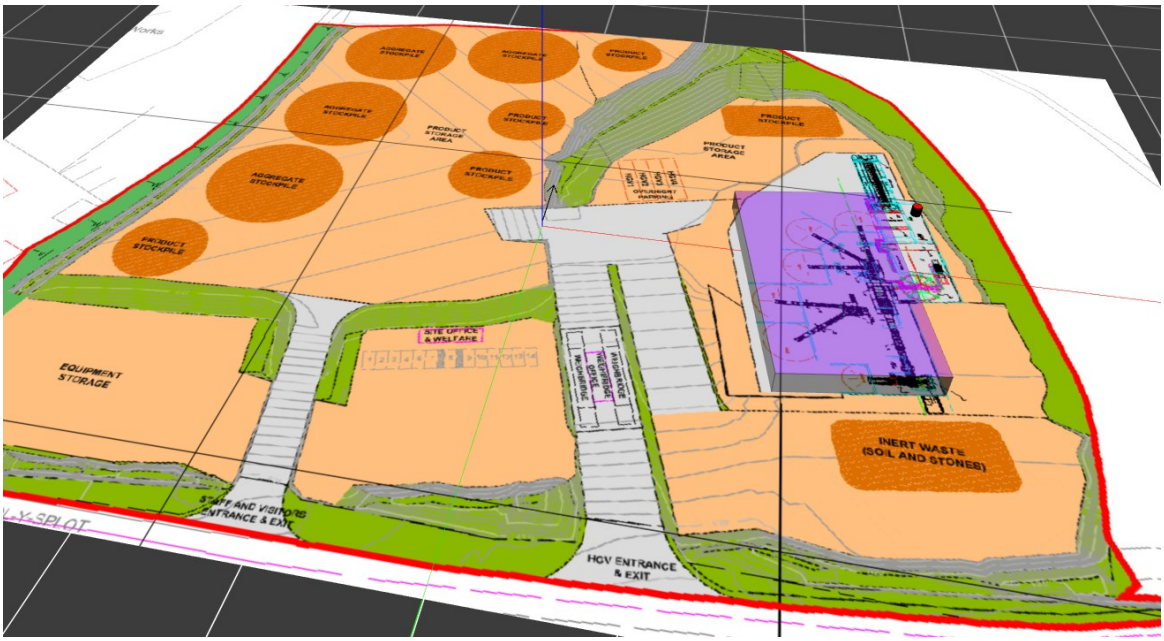

Figure A5.5: Flue Location (Red Cylinder) & Modelled Volume Source (Purple Cuboid)

Contains Technia Environment and Planning Ltd drawing no 11060 - 000 – C.

Meteorological Data

A5.15 As described in Paragraph A5.4, meteorological data from St. Athan have been used in the model. For the purpose of modelling the diesel generator and recycling plant emissions, data for the years 2015 – 2019 have been used. A wind rose for the site for the years 2015 – 2019 is provided in Figure 7.

Model Verification

A5.16 It is not practical, nor usual, to verify the ADMS-5 model.

Post-processing

A5.17 Emissions from the generator plant will be predominantly in the form of nitrogen oxides (NOx) and PM_{10}. ADMS-5 has been run to predict the contribution of the generator emissions to annual mean concentrations of nitrogen oxides and PM_{10}, and to the 99.79th percentile of 1-hour mean nitrogen oxides concentrations and the 90.4th percentile of 24-hour mean PM_{10} concentrations. For the initial screening of the process contributions, the approach recommended by the Environment Agency (2005) has been used to predict nitrogen dioxide concentrations, assuming that:

- annual mean NO_2 concentration = annual mean NOx concentration multiplied by 0.7; and
- 99.79th percentile of 1-hour mean NO_2 concentrations = 99.79th percentile of 1-hour mean NOx concentrations multiplied by 0.35.

Deposition Rates

A5.18 Deposition has not been included within the dispersion model because the principal depositing component of concern is nitrogen dioxide and this is calculated from nitrogen oxides outside of the model. Instead, deposition has been calculated from the predicted ambient concentrations using the deposition velocities set out in Table A5.6. Deposition velocities refer to a height above ground, typically 1 or 2 m, although in practice the precise height makes little difference and here they have been applied to concentrations predicted at a height of 1.5 m above ground. The velocities are applied simply by multiplying a concentration (µg/m^3) by the velocity (m/s) to predict a deposition flux (µg/m^2/s). Subsequent calculations required to present the data as kg/ha/yr of nitrogen or sulphur and as keq/ha/yr for acidity follow basic chemical and mathematical rules[3].

Table A5.6: Deposition Velocities Used in This Assessment

Pollutant	Deposition Velocity (m/s)	Reference
Nitrogen Dioxide	0.0015 m/s (Grassland) 0.003 m/s (Forest)	AQTAG06 (AQTAG, 2011)

A5.19 Wet deposition has been discounted. Wet deposition of the emitted pollutants this close to the emission source will be restricted to wash-out, or below cloud scavenging. For this to occur, rain droplets must come into contact with the gas molecules before they hit the ground. Falling raindrops displace the air around them, effectively pushing gasses away. The low solubility of nitrogen dioxide means that any scavenging of this gas will be a negligible factor.

[3] For example, 1 kg N/ha/yr = 0.071 keq/ha/yr

A6 Diesel Generator Plant Specification

A6.1 The aggregate recycling plant will be powered using a diesel-fired generator close to the eastern boundary of the site. Specification for this plant, upon which the assessment has been based, is shown in Table A6.1.

Table A6.1: Energy Plant Specifications

Parameter	Value	Restriction
Gross Peak Fuel Input (kW)	1,334.1	Max
Hours of Use per Annum	3,380	Max
Annual Fuel Input (kWh/annum)	4,509,166	Max
Exhaust Temperature (°C)	488	Min
Flue Internal Diameter (m)	0.25	Max
Efflux Velocity (m/s)	31.9	Min
NOx Emission Rate (mg/kWh)	0.2045	Max [a]
PM_{10} Emission Rate (mg/kWh)	0.0108	Max

[a] The modelled emission rates meet the MCPD emission limit. If the generator is required to instead meet the Stage IIIB emission limit for NOx, it is considered that this will not significantly affect the conclusions of this assessment.

A6.2 The restrictions set out in Table A6.1 should be adhered in order to ensure that the final plant design does not lead to impacts greater than those modelled. To further emphasise these, the final design should adhere to the following minimum specifications:

- the generator must be designed such that it will operate with a minimum efflux velocity of 32 m/s to allow for good initial dispersion of emissions;
- a diesel generator, capable of delivering 500 kVA on demand, must have a flue with a maximum internal diameter of 0.25 m at the exit point, terminating at least 2.29 m above ground level; and
- all stacks should discharge vertically upwards and be unimpeded by any fixture on top of the stack (e.g. rain cowls).

A6.3 If installed generator deviates significantly from the modelled specification, additional future modelling may be required in order to ensure that there are no significant adverse air quality impacts.

A7 Construction Mitigation

A7.1 Table A7.1 sets out a list of best-practice measures from the IAQM guidance (IAQM, 2016a) that should be incorporated into the specification for the works. These measures should ideally be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Table A7.1: Best-Practice Mitigation Measures Recommended for the Works

Measure	Desirable	Highly Recommended
Communications		
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager		✓
Display the head or regional office contact information		✓
Dust Management Plan		
Develop and implement a Dust Management Plan (DMP) approved by the Local Authority which documents the mitigation measures to be applied, and the procedures for their implementation and management	✓	
Site Management		
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken		✓
Make the complaints log available to the local authority when asked		✓
Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book		✓
Monitoring		
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Local Authority when asked		✓
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions		✓
Preparing and Maintaining the Site		
Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible		✓
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site		✓
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period	✓	

Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods	✓	
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below	✓	
Cover, seed, or fence stockpiles to prevent wind whipping	✓	
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all vehicles switch off their engines when stationary – no idling vehicles		✓
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable		✓
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	✓	
Operations		
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems		✓
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate		✓
Use enclosed chutes, conveyors and covered skips		✓
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate		✓
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods	✓	
Waste Management		
Avoid bonfires and burning of waste materials		✓
Measures Specific to Construction		
Avoid scabbling (roughening of concrete surfaces), if possible	✓	
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place	✓	
Measures Specific to Trackout		
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use	✓	
Avoid dry sweeping of large areas	✓	
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport	✓	

Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);	✓	