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Appendix 8.2 – Detailed Assessment Methodology

ENGINEERING CONSULTING

Document approval

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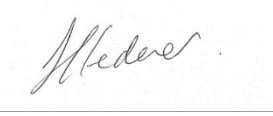
Prepared by:	Hannah Lederer		Environmental Scientist	12/02/2021
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1 Introduction

This Appendix has been produced to support Chapter 8 – Air Quality, Odour and Human Health, of the Environmental Impact Assessment Report (EIAR) to support the planning application for an Energy Recovery Park (ERP) (the Proposed Development) at Killoch, East Ayrshire.

This Appendix provides the detailed assessment methodology used to determine the significance of potential air quality impacts caused by construction activities, process and vehicle emissions, and fugitive dust and odour.

2 Construction and Decommissioning Activities

2.1 Introduction

There is the potential for dust to be released into the atmosphere as a result of construction activities. Within the EIAR these fugitive dust emissions have been assessed on a qualitative basis in accordance with the methodology outlined within the 2014 IAQM guidance document - 'Guidance on the assessment of dust from demolition and construction'. This guidance sets out the methodology for assessing the air quality impacts of construction and demolition and identifies good practice for mitigating and managing air quality impacts.

The assessment is based on the risk of a construction site giving rise to dust impacts and the sensitivity of the surrounding area. The risk of dust emissions from a construction site causing loss of amenity and / or health or ecological effects is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc.);
- The duration of these activities;
- The size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of the receptors to dust.

The quantity of dust emitted is related to the area of land being worked and the level of construction activities, in terms of the nature, magnitude and duration of those activities. The wind direction, wind speed and rainfall at the time when a construction activity is taking place will also influence whether there is likely to be a dust impact. Atmospheric conditions which promote adverse impacts can occur in any direction from a site. However, adverse impacts are more likely to occur downwind of the prevailing wind direction and / or close to the worked areas. Impacts are also more likely to occur during drier periods as rainfall acts as a natural dust suppressant.

Activities are divided into four types to reflect their different potential impacts. These are:

1. Demolition;
2. Earthworks;
3. Construction; and
4. Trackout.

“Trackout” is a less well-known term, and is defined by the IAQM as “The transport of dust and dirt from the construction/ demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

The approach considers three separate dust effects:

1. Annoyance due to dust deposition;
2. Harm to ecological receptors; and
3. The risk of health effects due to significant increase in exposure to PM_{10} (particulate matter with a diameter less than 10 µm).

2.2 Methodology

The first stage is to determine whether the impact can be screened out as 'negligible', or whether a more detailed assessment is required. The IAQM recommends that the developer would normally be required to undertake a detailed assessment where there is:

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

If the development cannot be screened out, the developer is to provide a clear description of the proposed demolition and construction activities, their location and duration, and any phasing of the development.

A human receptor, in this context, is any location where a person may experience the annoyance effects of airborne dust or dust deposition or suffer exposure to PM_{10} over a period of time relevant to the AQALs. These include:

- Residential dwellings;
- Schools;
- Hospitals;
- Care homes;
- Hotels;
- Gardens (where relevant public exposure is likely i.e. excluding extremities of gardens or front gardens); and
- Sensitive commercial premises including; vehicle showrooms, food manufacturers; and electronics manufacturers.

Ecological receptors should include statutory and non-statutory designated sites.

If a detailed assessment is required, the second stage is to assess the risk of dust effects arising. A site is allocated to a risk category based on two factors; dust emission magnitude; and the sensitivity of the area. These factors are combined to give the risk of dust impact in the absence of any mitigation measures.

The third stage is to define appropriate, site-specific, mitigation measures. The final stage is to determine whether significant effects are likely. For almost all construction activities, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience has shown that this is normally possible.

2.3 Assessment Criteria

For developments where a detailed assessment is required, a risk category is determined based on two factors;

1. dust emission magnitude; and
2. the sensitivity of the area.

These factors are combined to give the risk of dust impacts in the absence of any mitigation measures.

2.3.1 Dust emission magnitude

The dust emission magnitude is based on the scale of the anticipated works and should be classified as small, medium or large. The following are example of how the potential dust emissions magnitude for different activities can be defined as set out in the IAQM guidance:

Table 1: Dust Emission Magnitude Criteria

Magnitude	Description
Demolition Activities	
Large	total building volume > 50,000 m³, potentially dusty construction material (i.e. concrete), on-site crushing and screening, demolition activities > 20m above ground level
Medium	total building volume 20,000 - 50,000 m³, potentially dusty construction material, demolition activities 10 – 20m above ground level
Small	total building volume < 20,000 m³, construction material with low potentially for dust release (i.e. metal cladding or timber), demolition activities <10m above ground level, demolition during wetter months
Earthworks	
Large	total size area > 10,000m², potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds > 8m in height, total material moved > 100,000 tonnes
Medium	total size area 2,500 – 10,000m², moderately dusty soil type (i.e. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8m in height, total material moved 20,000 – 100,000 tonnes
Small	total size area < 2,500m², soil type with large grain size (i.e. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4m in height, total material moved < 10,000 tonnes, earthworks during wetter months
Construction Activities	
Large	total building volume > 100,000m³, piling, on site concrete batching, sandblasting
Medium	total building volume 25,000 – 100,000m³, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	total building volume < 25,000m³, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	
Large	> 50 HDV (> 3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m
Medium	10 – 50 HDV (> 3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100 m
Small	< 10 HDV (> 3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length < 50 m

Source: Section 7.2, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

Only receptors within 50 m of the routes(s) used by vehicles on the public highway and up to 500 m from the site entrance(s) are considered to be at risk from the effects of dust from trackout.

2.3.2 Sensitivity of the area

The sensitivity of the area takes 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, such as trees or other vegetation, to reduce the risk of wind-blown dust.

The type of receptors at different distances from the site boundary or, if known, from the dust generating activities, should be included. Consideration should also be given to the number of `human receptors'. Exact counting of the number of `human receptors' is not required. Instead, the guidance recommends that judgement is used to determine the receptors (a residential unit is one receptor) within each distance band.

There is no unified sensitivity classification scheme that covers the different potential effects on property, human health and ecological receptors. However, the following guidance is provided on the sensitivity of different types of receptors. For the sensitivity of people and their property to soiling, it is recommended that professional judgement is used to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the principles presented in Table 2.

Table 2: Sensitivity to Dust Soiling Effects

Sensitivity	Justification
High	• Users can reasonably expect an enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by dust deposition; or • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land. Indicative examples include dwellings, museums 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, aesthetic or value of their property could be diminished by dust deposition; or • The people or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land; Indicative examples include parks and places of work.
Low	• The enjoyment of amenity would not reasonably be expected; or • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by dust deposition; or

Sensitivity	Justification
	• 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. Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short-term car parks and roads.

Source: Box 6, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

For the sensitivity of people to the health effects of PM_{10} the IAQM guidance recommends that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period as presented in Table 3.

Table 3: Sensitivity to Heath Effects of PM_{10}

Sensitivity	Justification
High	• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
Medium	• Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24- hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
Low	• Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets

Source: Box 7, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

Table 4 provides an example of possible sensitivities of receptors to ecological effects.

Table 4: Sensitivity to Ecological Effects

Sensitivity	Justification
High	• Locations with an international or national designation and the designated features may be affected by dust deposition; or • Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain.

Sensitivity	Justification
	Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
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. Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	• Locations with a local designation where the features may be affected by dust deposition. Indicative example is a local Nature Reserve with dust sensitive features.

Source: Box 8, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

Table 5, Table 6 and Table 7 show how sensitivity of the area should be determined for dust deposition, human health and ecosystem impacts respectively. The sensitivity of the area is then derived for construction, earthworks and trackout.

Table 5: Sensitivity of the Area to Dust and Soiling Impacts on People and Property

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

Source: Table 2, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

Table 6: Sensitivity of the Area to Human Health Impacts

Receptor sensitivity	Annual mean PM_{10} Conc.	No. of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>18 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	16-18 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
		>100	High	Medium	Low	Low	Low

Receptor sensitivity	Annual mean PM_{10} Conc.	No. of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
	–14-16 µg/m³	10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<14 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>18 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	16-18 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	–14-16 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<14 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Source: Table 3, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

Table 7: Sensitivity of the Area to Ecological Impacts

Receptor sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Source: Table 4, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

2.3.3 Risk of dust impacts

The dust magnitude and sensitivity of the area are then combined using the following matrices to determine the risk of impacts with no mitigation applied. For the cases where the risk category is 'negligible', no mitigation measures beyond those required by accepted best practice would be necessary.

Table 8: Risk of Dust Impacts – Level of Mitigation Required

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Low risk	Low Risk	Negligible

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
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

Source: Tables 6-9, Guidance on the assessment of dust from demolition and construction, IAQM (2014)

2.3.4 Assessment of significance

The assessment of significance for construction dust is intended to take into consideration the incorporated mitigation and proposed mitigation measures. As these are determined in response of the risk as calculated in this assessment, it is concluded that the residual adverse effect will be 'not significant', providing suggested mitigation measures are implemented.

3 Process and Vehicle Emissions

3.1 Methodology

To support the assessment of process (emissions from the main stack of the ERP) and vehicle emissions detailed modelling has been carried out. Full details of the modelling methodology and inputs are provided in Appendix 8.4 for process, and Appendix 8.5 for vehicle emissions.

The process emissions model has been used to predict the ground level concentration of pollutants on a long and short term basis across a grid of points. It has also been used to predict the concentration at nominated points to represent sensitive receptors.

For receptors which are within 200 m of the routes used for vehicles associated with the development, there is the potential risk of impact from in-combination vehicle and process emissions. This is limited to those pollutants with the most risk from vehicles, namely nitrogen dioxide and particulate matter. Therefore, roads modelling has been undertaken to assess this impact. Appendix 8.5 – Roads Emissions Modelling contains further detail on the modelling methodology and inputs and considers the results in combination with the process emissions from the operation of the ERP.

For some pollutants which accumulate in the environment such as dioxins and dioxin-like PCBs, inhalation is only one of the potential exposure routes. Therefore, other exposure routes have been considered. A detailed Dioxin Pathway Intake Assessment has been carried out using an industry standard method. Full details of the modelling methodology and inputs can be found in Appendix 8.6 – HHRA.

3.2 Assessment Criteria

3.2.1 Human health

For the Proposed Development to operate it would need to satisfy industrial permitting requirements set out and monitored by the Scottish Environmental Protection Agency (SEPA). SEPA guidance H1 should be used to assess the impact for permitting requirements. However, this guidance has not been developed for conducting an assessment to accompany a planning application. Consequently, guidance has been developed by the IAQM for professionals operating within the planning system (Land-use planning & development control: planning for air quality, IAQM 2017). This provides planning officers and developers with a means of reaching sound decisions, having regard to the air quality implications of development proposals. The IAQM 2017 guidance states that it may be adapted using professional judgement. Therefore, where appropriate, SEPA H1 guidance has been incorporated which is considered appropriate given that the Proposed Development would need to satisfy the industrial PPC Permitting requirements set out by SEPA.

The IAQM 2017 guidance includes the following matrix which should be used to describe the impact based on the change in concentration relative to the AQAL and the overall predicted concentration from the scheme - i.e. the future baseline plus the process contribution.

Table 9: IAQM Magnitude of Change Descriptors

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

It is intended that the change in concentration relative to the AQAL (the process contribution) is rounded to the nearest whole number. Therefore, any impact which is between 0.5% and 1.5% would be classified as a 1% change in concentration. An impact of less than 0.5% is described as negligible, irrespective of the total concentration.

The above matrix is only designed to be used with annual mean concentrations. The approach for assessing the impact of short term emissions has been carried out in line with the IAQM 2017 guidance. This does not take into account the background concentrations as it is noted that background concentrations are less important in determining the severity of impact for short term concentrations.

Consequently, for short term concentrations (i.e. those averaged over a period of an hour or less), the following descriptors of change are used to describe the impact:

- < 10% - negligible;
- 10 - 20% - slight;
- 20 - 50% - moderate; and
- 50% - substantial.

The IAQM 2017 guidance states that, in relation to the significance of short-term impacts, "*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 prominent local sources*."

Therefore, if a short-term impact cannot be screened out as 'negligible' or 'insignificant', consideration will be given to the risk of exceeding the short-term AQAL when determining the significance of effect.

The IAQM 2017 guidance does not provide any descriptors for averaging periods of between 1 hour and a year. Therefore, for these periods the IPPC H1 criteria have been used, which state that process contributions can be considered insignificant if:

- The long-term process contribution is <1% of the long term environmental standard; and
- the short term process contribution is <10% of the short term environmental standard.

Where an impact cannot be screened out as "insignificant" based on the outputs of the initial screening and modelling, the significance of the effect has been determined based on professional scientific judgement of the likelihood of emissions causing an exceedance of an AQAL. This is a standard approach which allows the risk and likelihood of exceedance to be investigated and assessed in detail, following the first stage assessment.

In addition to the guidance listed above, the Environment Agency guidance document 'Guidance on assessing group 3 metals stack emissions from incinerators - V.4 June 2016' for assessing the impact of emissions of metals relative to their respective AQALs, states that where the process contribution (PC) for any metal exceeds 1% of the long term or 10% of the short term environmental standard (in this case the AQAL), this is considered to have potential for significant pollution. Where the PC exceeds these criteria, the PEC should be compared to the environmental standard. The PEC can be screened out where the PEC is less than the environmental standard. Where the impact is within these parameters, it can be concluded that there is no risk of exceeding the AQAL and, as such, the magnitude of change and significance of effect is considered negligible. This guidance has been applied in lieu of any specific guidance relating to emissions of metals from municipal waste incinerators from SEPA.

For those substances which have the potential to accumulate in the environment, Tolerable Daily Intakes (TDI) (the amount of contaminant which can be ingested daily over a lifetime without appreciable health risk) and Index Doses (ID) (a level of exposure which is associated with a negligible risk to human health), are defined. Where the impact of process emissions is within these levels, emissions are expected to make a negligible impact on human health.

The IAQM 2017 guidance notes that for those circumstances where a single development can be judged in isolation, it is likely that a ‘moderate’ or ‘substantial’ impact will give rise to a significant effect and a ‘negligible’ or ‘slight’ impact will not have a significant effect. However, this is not definitive guidance as other factors must be taken into consideration, including

- 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; and
- any other factors may be relevant in individual cases.

The overall judgement should be made by made by a competent professional.

3.2.2 Ecological effects

In May 2020 the IAQM updated the guidance document ‘A guide to the assessment of air quality impacts on designated nature conservation sites’ (the IAQM 2020 Guidance). This guidance draws on IPPC H1, which states that to screen out impacts as ‘insignificant’ at European and UK statutory designated sites:

- the long-term process contribution must be less than 1% of the long-term environmental standard (i.e. the Critical Level or Load); and
- the short-term process contribution must be less than 10% of the short-term environmental standard.

If the above criteria are met, no further assessment is required. If the long-term process contribution exceeds 1% of the long-term environmental standard, the PEC must be calculated and compared to the standard. If the resulting PEC is less than 70% of the long-term environmental standard, IPPC H1 states that the emissions are ‘insignificant’ and further assessment is not required. In accordance with the guidance, calculation of the PEC for short-term standards is not required.

IPPC H1 states further that to screen out impacts as ‘insignificant’ at local nature sites:

- the long-term process contribution must be less than 100% of the long-term environmental standard; and

- the short-term process contribution must be less than 100% of the short-term environmental standard.

In accordance with IPPC H1, calculation of the PEC for local nature sites is not required. However, with regard to local nature sites, the IAQM (2020) guidance states:

"For local wildlife sites and ancient woodlands, the Environment Agency uses less stringent criteria in its permitting decisions. Environment Agency policy for its permitting process is that if either the short-term or long-term PC is less than 100% of the critical level or load, they do not require further assessment to support a permit application. In ecological impact assessments of projects and plans, it is, however, normal practice to treat such sites in the same manner as SSSIs and European Sites, although the determination of the significance of an effect may be different. It is difficult to understand how the Environment Agency's approach can provide adequate protection."

This applied to the Environment Agency and SEPA. As such, it is considered appropriate to apply the screening criteria for SSSIs and European Sites to local nature sites when screening out the requirement for further consideration of the significance of effect for planning. Using the SEPA guidance is considered appropriate as the Proposed Development would also require a PPC Permit to operate.

Where an impact cannot be screened out as 'insignificant' further analysis has been undertaken by the project ecologist and this analysis is provided in Chapter 12 of the EIAR.

As a requirement of the Habitats Regulations the assessment at European designated sites should consider the potential for in combination impacts with other consented and planned development. The Design Manual for Roads and Bridges (DMRB) considers any receptor within 200 m of a road source to be potentially affected by that operation. Therefore, further consideration of the in combination impact with other plans and projects at any European designed ecological sites within 15 km of the Proposed Development and within 200 m from a trunk road will be carried out.

4 Fugitive Dust and Odour

4.1 Methodology

There is the potential for fugitive emissions of dust and odour to be released from the Proposed Development during the operational phase, especially during the delivery, unloading and storing of materials. These have been assessed on a qualitative basis based on the potential for releases of dust and odour, the distance to nearest sensitive receptors, and the prevailing wind direction.

The IAQM guidance on the assessment of odour for planning (2018) (the IAQM 2018 guidance) has been developed to assist in the assessment of the effects of odour on amenity. The IAQM note that before an adverse effect can occur there must be odour exposure. For odour exposure to occur all three links in the source-pathway-receptor chain must be present. The magnitude of effect experienced is determined by the scale of the exposure (considering the Frequency, Intensity, Duration and Odour unpleasantness, FIDO) and the sensitivity of the receptor (L, denoting the location), which is often taken to be a surrogate for the sensitivity and incorporates the social and physical factors that can be expected for a given community.

As with the dust assessment the likely magnitude of effect is a combination of the risk of exposure and the sensitivity of the receptors. The risk of exposure is determined based on the source odour potential and the pathway effectiveness.

When determining the risk of exposure, the first stage is to categorise the source odour potential using the following risk ranking:

Table 10: Source Odour Potential Criteria

Source Potential	Description
Large	• Larger Permitted processes of odorous nature or large Sewage Treatment Works (STWs). • Materials usage hundreds of thousands of tonnes/m^3 per year. • Area sources of thousands of m^2. • Compounds involved are very odorous, having very low Odour Detection Thresholds (ODTs) where known. • Process classes as “most offensive” or compounds/odours having unpleasant to very unpleasant hedonic score. • Open air operation with no containment, reliance solely on good management techniques and best practice.
Medium	• Smaller Permitted processes or small STWs. • Materials usage thousands of tonnes/m^3 per year. • Area sources of hundreds of m^2. • Compounds involved are very odorous, having very low Odour Detection Thresholds (ODTs) where known. • Process classified in Environment Agency guidance H4 as “moderately offensive” or compounds/odours having unpleasant to very unpleasant hedonic score. • Some mitigation measures in place, but significant residual odour remains.
Small	• Smaller Permitted processes or small STWs.

Source Potential	Description
	• Materials usage hundreds of tonnes/ m^3 per year. • Area sources of tens m^2. • Processes classed in Environment Agency guidance H4 as "less offensive". • Effective, tangible mitigation measures in place (e.g. Best Available Techniques (BAT), Best Practicable Means (BPM) leading to little or no residual odour.

The next stage is to determine the pathway effectiveness as a transport mechanism for odour. This includes consideration of the distance, whether the receptors are down wind of the odour source, the effectiveness of the release, the topography and terrain between the source and receptor. Using the following risk ranking the pathway effectiveness can be categorised as ineffective, moderately effective or highly effective.

Table 11: Pathway Effectiveness Criteria

Pathway Effectiveness	Description
Highly effective	• Receptor is adjacent to the source/site. • Direction – high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind).
Moderately effective	• Receptor is local to the source.
Ineffective	• Receptor is remote from the source. • Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind).

The risk of odour at receptor locations is then determined using the following matrix considering the pathway effectiveness and source odour potential.

Table 12: Risk of Odour Exposure Criteria

Pathway Effectiveness	Source Odour Potential		
	Small	Medium	Large
Highly effective	Low risk	Medium risk	High risk
Moderately effective	Negligible risk	Low risk	Medium risk
Ineffective	Negligible risk	Negligible Risk	Negligible risk

The sensitivity of receptors to odours is determined using the following principles.

Table 13: Sensitivity of Receptor

Sensitivity of receptor	Description
High	Surrounding land where: • users can reasonably expect enjoyment of a high level amenity; and • people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

Sensitivity of receptor	Description
	Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium	Surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level as amenity as in their home; or • people 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. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads.

The next step is to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity, as shown by the following matrix.

Table 14: Odour Impact Criteria

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High risk	Slight adverse	Moderate adverse	Substantial adverse
Medium risk	Negligible	Slight adverse	Moderate adverse
Low risk	Negligible	Negligible	Slight adverse
Negligible	Negligible	Negligible	Negligible

4.2 Assessment of significance

The IAQM 2018 odour guidance states that 'where the overall effect is greater than 'slight adverse', the effect is likely to be considered significant.

Although not specifically developed for assessing fugitive dust from operational sites the approach for construction dust (set out in Section 2) has been applied when determining the impact of fugitive dust release from the Proposed Development in lieu of any other specific guidance.

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