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Consulting Engineers Limited

Viridor

Air Quality Assessment

Tees Valley Bottom Ash Facility
Grangetown Prairie, Dorman Point
Prepared on behalf of Viridor Waste Limited
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Air Quality Assessment

ENGINEERING CONSULTING

Document approval

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Management Summary

Fichtner Consulting Engineers Ltd (Fichtner) has been engaged by Viridor Waste Limited to undertake an Air Quality Impact Assessment to support the planning application for the development of a Bottom Ash (BA) Facility (the Proposed Development), to be located adjacent to the proposed Tees Valley Energy Recovery Facility in the Grangetown Prairie Zone of the South Tees Development Corporation Regeneration Area.

This assessment has been undertaken to determine the impact of the Proposed Development on local air quality, comprising an assessment of dust and vehicle emissions during the construction and operation.

The assessment has been carried out in a number of stages.

Review of Legislation and Planning Policy

In the UK, the levels of pollution in the atmosphere are controlled by a number of European Directives, which have been fully implemented, and by the National Air Quality Strategy. These have led to the setting of a number of Air Quality Assessment Levels (AQALs) for pollutants.

There is no prescriptive methodology for air quality assessment outlined in either the National Planning Policy Framework or Planning Practice Guidance. Therefore, practitioners are directed to use guidance provided by other non-governmental organisations. In this case the guidance published by the Institute of Air Quality Management (IAQM) has been applied.

This assessment has been carried out to determine the impact of the Proposed Development on air quality to satisfy the requirements of the national Planning Practice Guidance with reference to guidance produced by the IAQM.

Assessment

The assessment has considered the impact of dust emissions from construction, earthworks and trackout activities during the construction phase, dust emissions from operational phase activities, and vehicle emissions during the construction and operational phases, using guidance from the IAQM.

The assessment of the impact of dust generating activities during the construction takes into account the type of activities undertaken and the number of sensitive human and ecological receptors within set distances from these activities. The overall risk of dust impacts from construction phase activities has been assessed as ‘low risk’. Mitigation measures have been recommended appropriate for the risk rating of the works in accordance with the IAQM methodology. With the implementation of these recommended measures the residual effect is deemed to be ‘not significant’.

The impact of dust generating activities during the operational phase has been undertaken using the same principles. The design of the Proposed Development includes a number of dust mitigation measures to suppress dust generation. With the implementation of these measures, the residual impact of dust emissions will be negligible. As the area around the Proposed Development is of ‘low sensitivity’ to dust impacts, the overall effect of dust emissions during the operational phase is ‘not significant’, either alone or in-combination with other plans and projects.

The trip generation estimation for both the construction and operational phases of the Proposed Development falls well below the IAQM criteria for progressing with an assessment. Therefore, the

impact on air quality of the operational phase transport emissions is deemed to be negligible and 'not significant', either alone or in-combination with other plans and projects.

Conclusion

This assessment has demonstrated that with the appropriate level of mitigation for dust emissions during construction and operational phase activities, the Proposed Development would not result in a significant air quality impact. Therefore, there should be no air quality constraint to granting planning permission for the Proposed Development.

Contents

1 Introduction

1.1 Background

Fichtner Consulting Engineers Ltd (Fichtner) has been engaged by Viridor Waste Limited (the Client) to undertake an Air Quality Assessment (AQA) to support the outline planning application for the development of a Bottom Ash (BA) Facility (the Proposed Development). The Proposed Development is to be located adjacent to the proposed Tees Valley Energy Recovery Facility (TVERF) in the Grangetown Prairie Zone of the South Tees Development Corporation Regeneration Area, within the administrative area of Redcar and Cleveland Borough Council (RCBC).

The Proposed Development will process around 100,000 tonnes per annum (tpa) of BA from the TVERF, which will be transferred via covered conveyor, or by covered vehicles via an internal link, or by road, and have the capacity to process an additional 80,000 tpa of BA from third party sources which will be transferred in and out of the Proposed Development by road.

1.2 Scope of the assessment

The following aspects of the Proposed Development will have the potential to affect local air quality:

- Vehicle emissions during the construction and operational phases;
- Dust emissions due to construction activities during the construction phase; and
- Dust emissions due from the processing, storage and handling of BA during the operational phase.

The air quality effects of each of the above have been considered in this assessment.

1.3 Structure of the report

This report has the following structure:

- National and international air quality legislation and guidance, and local planning policies which relate to air quality, are considered in section 2.
- The assessment methodology is outlined in section 3.
- The baseline conditions are described in section 4.
- The impact of vehicle and dust emissions during the construction phase is assessed in section 5.
- The impact of vehicle and dust emissions during the operational phase is assessed in section 6.
- The cumulative impacts of the Proposed Development with other plans and projects is considered in section 7.
- The conclusions of the assessment can be found in section 8.
- The Appendices include illustrative figures, detailed assessment methodologies and recommended construction phase dust mitigation measures.

2 Legislation and Planning Policy Context

2.1 National Planning Policy Framework

In terms of air quality, paragraph 181 of the National Planning Policy Framework (NPPF) states:

"Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

The Planning Practice Guidance (PPG) was issued on-line on 6 March 2014 and is updated by the Government as a live document. The latest update was on 1 November 2019. The Air Quality section of the PPG describes the circumstances when air quality, odour and dust can be a planning concern requiring assessment.

It states that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. It acknowledges that they could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife). The steps a local planning authority[1] might take in considering air quality are set out below:

"Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion with a Smoke Control Area; or extraction systems (including chimney) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.".*

Neither the NPPF nor the PPG is prescriptive on the methodology for assessing air quality effects or describing significance, practitioners continue to use guidance provided by Department for Environment Food and Rural Affairs (Defra) and non-governmental organisations, including the

[1] The Planning Practice Guidance, Air Quality Section, paragraph 006, reference ID 32-006-20191101

Institute of Air Quality Management (IAQM). However, it is recommended that the following forms part of assessments[2]:

- *"a description of baseline conditions and any air quality concerns affecting the area, and how these could change both with and without the proposed development;*
- *sensitive habitats (including designated sites of importance for biodiversity;*
- *the assessment methods to be adopted and any requirement for the verification of modelling air quality;*
- *the basis for assessing impact and determining the significance of an impact;*
- *where relevant, the cumulative or in-combination effects arising from several developments;*
- *construction phase impacts;*
- *acceptable mitigation measures to reduce or remove adverse effects; and*
- *measures that could deliver improved air quality even when legally binding limits for concentrations of major air pollutants are not being breached."*

The assessment includes each of the above recommended aspects.

The PPG provides advice on how air quality impacts can be mitigated and notes[3]:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important therefore that local planning authorities work with applicants to consider appropriate mitigation so as to ensure the new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met.

Examples of mitigation include:

- *maintaining adequate separation distances between sources of air pollution and receptors;*
- *using green infrastructure, in particular trees, where this can create a barrier or maintain separation between sources of pollution and receptors;*
- *appropriate means of filtration and ventilation;*
- *including infrastructure to promote modes of transport with a low impact on air quality (such as electric vehicle charging points);*
- *controlling dust and emissions from construction, operation and demolition; and*
- *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development".*

2.2 Control of dust and emissions during construction

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting Regulations, which would include the project construction site, are those provided in Section 80 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

"any dust, steam, smell or other effluvia arising on industrial trade or business premises and being prejudicial to health or a nuisance."

[2] The Planning Practice Guidance, Air Quality Section, paragraph 007, reference ID 32-007-20191101

[3] The Planning Practice Guidance, Air Quality Section, paragraph 008 Reference ID 32-008-20191101

Enforcement of the Act, in regard to nuisance, is under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the local authority is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Act requiring abatement and any necessary works to achieve it.

2.3 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) local authorities are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future ambient pollutant concentrations against air quality assessment levels (AQALs). If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the local authority is required to declare an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutants levels in pursuit of the relevant AQALs.

3 Assessment Methodology

3.1 Construction phase dust generating activities

There is the potential for dust to be released into the atmosphere as a result of construction and demolition phase activities. These fugitive dust emissions have been assessed on a qualitative basis in accordance with the methodology outlined within the IAQM guidance document 'Guidance on the assessment of dust from demolition and construction' (2014) ("the IAQM 2014 Guidance"). 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 quantity of dust emitted will be related to the area of land being worked and the nature, magnitude and duration of construction activities.

The assessment methodology is based on the risk of a site giving rise to dust impacts and the sensitivity of the surrounding area. Activities are divided into four types to reflect their different potential impacts. These are:

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

"Trackout" is a less well-known term. It is defined by 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. This arises when lorries leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when lorries transfer dust and dirt onto the road having travelled over muddy ground on site."

The assessment methodology considers three separate dust effects:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to significant increase in exposure to PM_{10} (particulate matter with a diameter less than 10 µm).

The first stage of the assessment of the impact of fugitive emissions of dust during construction 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 will 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).

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

- 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 European, UK and locally designated sites.

If the development can be screened out from undertaking a detailed assessment, 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.

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. Full details of the methodology for assessing the risk of dust effects arising is presented in Appendix B.

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 through the implementation of suitable mitigation. Hence the residual effect would normally be 'not significant'.

3.2 Operational phase dust generating activities

There is no specific guidance for the assessment of operational phase dust generation. In lieu of any specific guidance, the principles of the construction phase dust guidance have been applied. The dust mitigation measures proposed as part of the design of the Proposed Development have been considered to assess the residual risk of dust emissions. Along with the sensitivity of the area to dust emissions, this has been used to determine the residual risk of dust impacts as a result of operational phase dust emissions.

3.3 Traffic emissions

3.3.1 Human health screening criteria

In 2017 the IAQM published the guidance document "Land-Use Planning & Development Control: Planning for Air Quality" ("the IAQM 2017 guidance"). This has been developed for professionals operating within the planning system. It provides them with a means of reaching sound decisions, having regard to the air quality implications of development proposals. The IAQM 2017 guidance states that an air quality assessment is required where a development would cause a "significant change" in Light Duty Vehicles < 3.5t (LDV) or Heavy Duty Vehicles >3.5 t (HDVs). The indicative criteria to progress to an assessment of the effect of vehicle emissions on human health are:

- A change in LDV flows of:
  - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA; or
  - more than 500 AADT elsewhere.
- A change in HDV flows of:

  - more than 25 AADT within or adjacent to an AQMA; or
  - more than 100 AADT elsewhere.
- Realignment of a road by more than 5 m or introduce/remove a junction near to relevant receptors.

The IAQM 2017 does not state what level of assessment is required if the indicative criteria above are met. As a conservative measure, the assessment would be undertaken on a quantitative basis using dispersion modelling software. If the above criteria are not met, a qualitative screening assessment will be undertaken to identify whether any potential for a significant effect remains. If there is no potential for a significant effect, the impact of vehicle emissions can be screened out as 'negligible'.

3.3.2 Ecological sites screening criteria

The Design Manual for Roads and Bridges (DMRB)[4] includes the following indicative screening criteria for the effects of vehicle emissions on designated habitat sites:

- A change in daily traffic flows of:
  - more than 1,000 Annual Average Daily Traffic (AADT); or
  - more than 200 AADT HDV flows;
- A change in speed band; or
- Realignment of a road by more than 5 m.

The DMRB guidance specifies that the above criteria only apply where an affected road lies within 200 m of the boundary of a designated habitat site. The IAQM guidance document "A guide to the assessment of air quality impacts on designated nature conservation sites", dated 2020 ("the IAQM 2020 guidance"), makes it clear that the above criteria are not to be applied rigidly and should be applied to in-combination effects at the initial "scoping" stage.

Based on the above, the level of traffic generated by the Proposed Development along roads which pass within 200 m of a designated habitat site has been considered and professional judgment used to determine whether there is the potential for a significant effect, either alone or in-combination with other plans and projects.

[4] Highways Agency, DMRB, Sustainability & Environment Appraisal, LA 105 Air Quality.

4 Baseline Conditions

4.1 Description of site and surroundings

The Proposed Development is to be located adjacent to the proposed TVERF in the Grangetown Prairie Zone of the South Tees Development Corporation Regeneration Area. The site is currently undeveloped and the surrounding land uses are primarily brownfield land to the east, a landfill site operated by Highfield Environmental to the north, the proposed TVERF to the west, the Teesworks Skills Academy to the south-west, and existing light industrial use to the south. The England Coast Path lies within 100 m of the site boundary to the north.

The Proposed Development will only be constructed if the TVERF is constructed. Therefore, the TVERF is considered to be in the baseline for the Proposed Development. The exception is during the construction phase of the Proposed Development, as the construction of the Proposed Development is likely to be concurrent with the construction of the TVERF.

4.2 Air quality review and assessment

Local authorities are required to periodically review and assess air quality within their area of jurisdiction. No AQMAs have been declared by RCBC. The closest AQMA is in Staithes, approximately 24 km south-east of the site. Due to the distance from the site, the impact of the Proposed Development on this and other AQMAs has been screened out of this assessment.

No air quality monitoring is undertaken in close proximity to the Proposed Development. In order to assist local authorities with their responsibilities under LAQM, the Defra provides modelled background concentrations of pollutants throughout the UK on a 1 km by 1 km grid. This model is based on known pollution sources and background measurements and is used by local authorities in lieu of suitable monitoring data. The mapped background concentration for the grid square containing the Proposed Development has been downloaded as presented in Table 1. As shown, the mapped background concentrations of all pollutants are well below the relevant AQALs.

Table 1: Mapped Background Data

Pollutant	Annual Mean AQAL (µg/m^3)	Concentration (µg/m^3)	Dataset
Nitrogen dioxide	40	13.87	DEFRA 2018 Dataset
Particulate matter (PM_{10})	40	10.52	DEFRA 2018 Dataset
Particulate matter ($PM_{2.5}$)	20	7.06	DEFRA 2018 Dataset

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5 Construction Phase Impact Assessment

There are two aspects of the construction phase which will potentially affect air quality:

- Emissions from construction vehicles travelling to and from the site; and
- Dust emissions from on-site construction phase activities.

5.1 Vehicle emissions

The construction phase of the development is planned to last approximately 35-40 weeks and is anticipated to generate 13 HGV movements, 21 light goods vehicle (LGV) or van movements and 44 car movements per day (all as 2-way AADT movements). The number of vehicle movements generated by the construction phase is well below the indicative criteria for requiring an air quality assessment detailed in section 3.3. In addition, the construction phase is temporary, and will last less than one year, so the above figures will be a significant over-estimate on an AADT basis. Therefore, the impact of construction phase vehicle emissions has been screened out as 'negligible' and has not been considered further in this assessment.

5.2 Dust emissions

The assessment of dust emissions during the construction phase has been undertaken in accordance with the methodology contained within Appendix B.

5.2.1 Stage one – screening

Figure 1 of Appendix A presents the site boundary proximity zones based on the methodology presented in Section 3.1.

The IAQM methodology outlined in section 3.1 is based on:

- The risk category for the site – which is based on the type of activity and the distance to the nearest receptor; and
- The sensitivity of the area – which is based on the number of properties within certain distances of the boundary of the works.

Table 2 outlines how many receptors have been identified within the relevant distance bands. For the assessment of trackout, it has been assumed that HGVs and tracked vehicles will access the site from Eston Road via new roadways to be constructed as part of the development of the Grangetown Prairie Zone of the South Tees Development Corporation Regeneration Area. The location of the receptors within the distance screening zones is shown in Figure 1.

There are no residential receptors within the relevant screening distances, so the number of commercial and industrial receptors has been reported. The England Coast Path passes within 100 m of the site boundary and has been included as a receptor. In addition, the proposed TVERF lies immediately to the west of the site. The construction of the TVERF is planned to be concurrent with the construction of the Proposed Development, so the TVERF has not been included as a sensitive receptor.

Table 2: Dust Sensitive Receptors - Number of Commercial and Industrial Receptors

Distance from the source (m)	Estimated number of receptors	
	From main dust generating areas	From site access routes
<20	0	1
<50	0	1
<100	1	-
<200	2	-
<350	~16	-

Note:

Distance from site access routes is used in the assessment of trackout, and only receptors within 50m of the edge of the road (up to 500m from the Site entrance) need to be considered.

As shown, there are no dust sensitive receptors within 50 m of the Proposed Development, one sensitive receptor within 100 m of the Proposed Development (the England Coast Path) and 1 receptor within 20 m of the site access road (the Teesworks Skills Academy), and approximately 16 sensitive receptors within 350 m. These receptors are all of medium or low sensitivity to dust soiling and human health effects in accordance with the criteria detailed in Table 8 and Table 9 in Appendix B. In addition, there are no ecological receptors within the screening distance of 50 m from the site boundary or access routes (up to 500 m from the site entrance).

5.2.2 Stage two - risk of dust emissions

5.2.2.1 Description of activities

The construction phase will comprise of earthworks/ground preparation and landscaping, the construction of the BA processing building and potentially including a covered conveyor or means of access via an internal link road with TVERF, along with ancillary roadways, parking and amenity structures.

The site currently comprises open land. As there are no structures on the site, no demolition works will be required and thus these have not been considered in the dust assessment.

5.2.2.2 Dust emission magnitude

The dust emission magnitude is based on the scale of anticipated works and is classified as small, medium or large. The criteria for these definitions are set out in Appendix B.2.

As a worst-case, it has been assumed that dust generating activities will occur in all parts of the site that will be developed. The dust emission magnitude for each type of activity has been assessed and is displayed in the following table.

Table 3: Dust emission magnitudes

Activity	Dust emission magnitude	Justification
Demolition	N/A	The site is currently undeveloped, so there will be no demolition activities during the construction phase. The impact of demolition activities does not need to be considered further in this assessment.
Earthworks	Large	The total area that may require earthworks is >100,000 m^2. Although the quantity of material to be moved has not yet been established, the scale of the Proposed Development indicated that it may be significant and therefore the dust emission magnitude is deemed to be large.
Construction	Large	The total volume of the buildings to be constructed is >10,000 m^3. Whilst the buildings are likely to be constructed primarily of metal which has a relatively low dust emission potential, the dust emission magnitude has conservatively been deemed to be large based on the size of the buildings to be constructed.
Trackout	Medium	Peak outward HGV movements likely to be between 10-50 HGVs per day.

5.2.2.3 Sensitivity of area

The area has been assessed for its sensitivity to dust soiling effects, human health effects to PM_{10} and ecological effects, using the criteria set out in Section B.3. These are displayed in Table 4 for each type of dust emission activity:

Table 4: Sensitivity of the Area to Dust

Effect	Sensitivity	Justification
Earthworks and Construction		
Dust soiling	Low	There are no receptors within 50 m of dust generating areas, and the more distant receptors are of low and medium sensitivity.
Human health impacts	Low	The baseline PM_{10} concentrations for the area are less than 24 µg/m^3* and thus sensitivity is deemed to be low.
Ecological effects	N/A	There are no ecological receptors within the relevant screening distances.
Trackout		
Dust soiling	Medium	There is one medium sensitivity receptor (Teesworks Skills Academy) within 20 m of the route used by construction vehicles on the public highway, up to 500m of the site access points.
Human health impacts	Low	The baseline PM_{10} concentrations for the area are less than 24 µg/m^3* and thus sensitivity is deemed to be low.

Effect	Sensitivity	Justification
Ecological effects	N/A	There are no ecological receptors within the relevant screening distances.
Note: **The baseline PM_{10} concentration is 10.5 µg/m³, as obtained from the Defra background map for the 1x1 km grid square containing the Proposed Development*		

5.2.2.4 Summary

The risk of dust impacts from construction and earthworks is summarised as using the criteria outlined in Appendix B.4. This is based on the dust emission magnitude and the sensitivity of the area.

Table 5: Summary of Dust Risk

Potential Impact	Demolition	Earthworks	Construction	Trackout
Dust Soiling	-	Low Risk	Low Risk	Low Risk
Human Health	-	Low Risk	Low Risk	Low Risk

5.2.3 Stage three – Identification of mitigation measures

The dust assessment has identified that the Proposed Development is of 'low risk' for dust soiling and human health effects due to dust emissions from earthworks, construction and trackout. The IAQM guidance recommends that general mitigation measures be applied according to the highest risk rating for the site. Appendix C presents the mitigation measures recommended for the risk category of the site. These are indicative measures and the final measures to be implemented should be agreed with the construction contractor and RCBC via a Construction Environmental Management Plan.

5.2.4 Stage four - summary

The assessment has screened out the need for a detailed assessment of dust impacts as a result of the demolition activities associated with the Proposed Development. When considering the construction phase activities to be undertaken, the site has been assessed to be of low risk for dust soiling and human health impacts. Appropriate mitigation measures have been identified. It is considered that with the implementation of the measures identified any residual effect will be 'not significant'.

6 Operational Phase Impact Assessment

6.1 Vehicle emissions

Traffic generation for the Proposed Development has been considered for two scenarios:

1. 100,000 tpa of BA is transferred from the TVERF by conveyor or internal road link and a further 80,000 tpa of BA is imported from other sources by road; and
2. 100,000 tpa of BA is transferred from the TVERF via the access road infrastructure outside of the site boundary, and a further 80,000 tpa of BA is imported from other sources by road.

The BA Facility will not be built unless the TVERF is built, so it is not necessary to consider a scenario where all 180,000 tpa is imported from other sources by road.

A summary of the traffic generation for scenarios 1 and 2 is presented in Table 6

Table 6: Traffic Generation

Scenario	HGVs		Vans		Cars	
	Daily[(1)]	AADT[(2)]	Daily[(1)]	AADT[(2)]	Daily[(1)]	AADT[(2)]
Scenario 1	60	52	4	4	20	18
Scenario 2	86	74	4	4	20	18

Note: all numbers are two-way movements, e.g., 60 2 day HGV movements = 30 HGVs in and 30 HGVs out. All figures have been rounded up to result in whole numbers as one-way trips.

(1) "Daily" = each day of 6-day operational week.

(2) "AADT" = Annual Average Daily Traffic.

As detailed in section 3.3 the IAQM screening criteria for progressing to an air quality assessment for human health effects, for locations not in or adjacent to an AQMA, is a change in vehicle flows of 100 HGVs or 500 LDVs on an AADT basis on roads with relevant receptors. For ecological receptors, the relevant criteria are a change of 1,000 AADT total or 200 AADT HGVs on roads within 200 m of a receptor.

In isolation, the traffic generated by the Proposed Development falls below these indicative criteria for requiring an air quality assessment. Furthermore:

- The traffic will disperse on the road network prior to passing any residential sensitive receptors, so the number of development-generated vehicles passing any relevant receptor will be even less.
- In scenario 2, 26 of the HGV movements (on each day of a 6-day operational week) are to and from the adjoining TVERF site, and therefore although they are included within our assessments and figures for robustness, these 26 movements have already been considered as part of the TVERF scheme.
- In both scenarios, the operation of the Proposed Development eliminates these 26 HGV movements from the wider road network, as the export of BA to third party facilities will not be required.
- As 26 of the HGV movements in scenario 2 are to and from the adjacent TVERF, these vehicles only have an impact on the short stretch of road outside the site boundaries between the TVERF and the Proposed Development. There are no sensitive receptors (homes, schools, etc) along this stretch of road. The impact on the wider road network is the same for scenarios 1 and 2.

Therefore, it is considered that the air quality effect on human health and ecology resulting from operational phase vehicle movements will be negligible.

6.2 Dust emissions from operational phase activities

6.2.1 Description of activities

The Proposed Development site comprises a BA processing building, with ancillary roadways, parking, and amenity spaces.

A proposed covered conveyor may transport approximately 100,000 tpa of BA from the TVERF to the raw BA hall for processing. Alternatively, this BA may be transported via vehicle using an internal link to the TVERF, or by road. The BA Facility will also have the capacity to process a further 80,000 tpa of BA from third parties, which would be delivered to the BA Facility by road. A wheel loader will pick up the raw BA and place it into storage bays for maturation over a 14-56 day period, over which the pH and moisture content of the BA drops. The BA is then screened and sorted.

The processed ash is collected by a bottom conveyor and discharged to an aggregates (Bottom Ash Aggregates, “BAA”) bay for removal, and either loaded straight into trucks or retained for a short period in the BAA buffer storage area.

6.2.2 Embedded mitigation measures

The raw BA to be transferred from the TVERF and from third party facilities will have been quenched in water. As the BA will be wet, there will be minimal potential for dust emissions. The conveyor from the TVERF and all vehicles which transfer materials to and from the Proposed Development will be fully enclosed, which will further reduce the risk of dust emissions.

All on-site storage and processing of BA will be within covered buildings. The loading and unloading of BA and BAA will be under cover. A wheel wash system and a road sweeper will be implemented to ensure that vehicles importing and exporting materials from the site will not result in trackout of dust onto the public road network.

Externally, ‘dust busters’ will be placed at strategic ash handling points, such as the under cover (but not necessarily enclosed) loading and unloading points, to provide dust suppression. In addition, a tractor with a water bowser for dust suppression around site, including on roads and stockpiles, may also be employed where necessary..

As the BA will be stored as moist material and is processed while still humid, dust emissions will be limited. Nonetheless, for any internal spaces a dust management system is proposed, comprising a bespoke dust suppression system that is likely to comprise of overhead sprays (under ceiling) in areas of potential dust generation, for example loading of raw BA into the screening systems.

An Environmental Permit will be needed to operate the Proposed Development this will include limits to ensure that dust is controlled.

6.2.3 Residual effect

As detailed in 5.2.2.3, the area around the Proposed Development is of ‘low’ sensitivity to dust emissions. With the implementation of the embedded mitigation measures detailed above, the residual risk of dust emissions will be ‘negligible’.

6.3 Significance of effect

The risk of a significant air quality effect during the operational phase from vehicle emissions and on-site dust emissions has been considered.

The net change in vehicle movements resulting from the operation of the Proposed Development is well below the IAQM screening thresholds for requiring an assessment. Therefore, the potential for a significant effect has been screened out and the effect will be 'not significant'.

With the implementation of embedded on-site dust suppression measures to mitigate against dust emissions, the residual effect of operational phase dust emissions will also be 'not significant'.

Based on the above, the overall significance of effect of the operational phase of the Proposed Development on local air quality will be 'not significant'.

7 Cumulative Assessment

7.1 Vehicle emissions

The number of vehicle movements generated by both the construction and operational phases of the Proposed Development are well below the screening criteria for requiring an air quality assessment and would disperse to even lower levels on the local road network. As such, it is considered that there is no potential for a significant cumulative effect on human health as a result of vehicle emissions associated with the Proposed Development.

As detailed in section 3.3.2, guidance from the DMRB states that there is the potential for a significant effect on a designated ecological habitat sites within 200 m of roads where there is a change in vehicle numbers of more than 1,000 AADT for all vehicles or more than 200 AADT for HGVs. The number of vehicle movements generated by the Proposed Development is below these thresholds, so there is no potential for a significant effect based on traffic generated by the Proposed Development in isolation.

Consideration has been given to the potential for a significant cumulative affect with other plans and projects at any designated habitat sites. The closest European site is the Teesmouth and Cleveland Coast SPA and Ramsar site (the SPA/Ramsar). Sections of the SPA/Ramsar lie within 200 m of the A1085 east of the Proposed Development and the A178 north of the River Tees. No other designated habitat sites lie within 200 m of roads along which development-generated traffic is likely to travel, at least between the Proposed Development and the junction of the A66 with the A19. At this distance from the Proposed Development the small amount of development-generated traffic generated would be expected to disperse significantly, so cumulative impacts beyond this point have been screened out.

The distribution of movements generated by the Proposed Development on the wider road network has not been assessed as part of the Transport Assessment for the project. However, it can be shown that no HGVs generated by the construction or operational phases of the Proposed Development will pass along the A1085 and A178 within 200 m the SPA/Ramsar, as follows:

- The only destination for vehicles travelling east on the A1085 is Redcar. Although there is a consented waste incineration project at the Redcar Bulk Terminal (the Redcar Energy Centre, REC, ref: R/2020/0411/FFM), this proposal includes an BA processing facility to process all BA from the REC, so no traffic will travel between the Proposed Development and the REC. Even if the REC were constructed without the BA processing facility and some of the BA were transported from the REC to the Proposed Development, the HGVs generated would not pass within 200 m of the SPA/Ramsar, as the access to the REC is to the west of Dormanstown and the relevant sections of the SPA/Ramsar lie to the north-east of Dormanstown.
- HGVs generated by the Proposed Development will not access the A178 by crossing the River Tees using the Tees Transporter Bridge, due to weight restrictions in place on this crossing. Any HGVs travelling north and south across the Tees would be routed along the A19, which does not pass within 200 m of the SPA/Ramsar.

As such, there is no potential for a significant cumulative effect at the SPA/Ramsar or any other designated habitat sites.

7.2 Dust emissions

Based on the screening criteria detailed in the IAQM 2014 Guidance, dust emissions during the construction and operational phase of the Proposed Development are only potentially significant

within screening distances of 350 m of the site boundary or 50 m of routes used by construction vehicles, up to 500 m from the site access point(s). As such, only dust sources within twice these distances (i.e., such that their screening distances would overlap with the Proposed Development) are considered to have the potential for a significant cumulative effect.

There is an active landfill site within 100 m of the north of the site boundary, and the TVERF will be located directly to the west of the site boundary. The construction phase of the TVERF will be concurrent with that of the Proposed Development. The landfill will contribute to local dust emissions as long as it is active and has been considered in the baseline. The construction phase of the TVERF will also cause localised dust emissions over the duration of the construction phase. As detailed in the planning documents for the TVERF, the risk of dust impacts from the construction of the TVERF alone is predicted to be 'low risk' and the residual effect, with appropriate mitigation measures, is predicted to be 'not significant'. Operational phase dust emissions from the TVERF are also predicted to be negligible and 'not significant'.

As detailed in section 5.2 there are no high-sensitivity receptors within the screening distances from the site boundary of the Proposed Development, and a small number of low and medium-sensitivity receptors, none of which lie within 50 m of the site boundary. The dust emission magnitude for the Proposed Development has been assessed as 'large' for construction and earthwork activities, so the inclusion of any cumulative dust sources would not affect the dust emission magnitude. Assuming that the operation of the landfill and the construction and operation of the TVERF (and all other cumulative schemes within 700 of the site boundary) are undertaken in accordance with best-practice guidance and the respective environmental permits, there will not be significant cumulative dust impacts.

Based on the above, the risk of a significant cumulative effect due to dust emissions is very low and the cumulative effect of construction and operational phase dust emissions will be 'not significant'.

8 Conclusions

The number of vehicle movements during both the construction and operational phases of the Proposed Development is well below the IAQM screening criteria for the requiring an assessment. Therefore, the potential for a significant effect due to vehicle emissions has been screened out and the effect will be 'not significant', either alone or cumulatively with other plans and projects.

The assessment of dust generating activities has deemed that the site is of low risk for dust soiling human health effects during the construction phase of the Proposed Development. Suitable mitigation measures have been recommended and with the implementation of these measures the effect of dust emissions during the construction phase on air quality will be 'not significant', either alone or cumulatively with other plans and projects.

A number of embedded mitigation measures to suppress dust are included as part of the design of the Proposed Development. With the implementation of these mitigation measures, residual effect of operational phase dust emissions will also be 'not significant', either alone or cumulatively with other plans and projects.

In conclusion, no significant air quality effects are predicted during either the construction or operational phases of the Proposed Development, and there should be no air quality constraint to granting planning permission for the Proposed Development.

Appendices

A Figures

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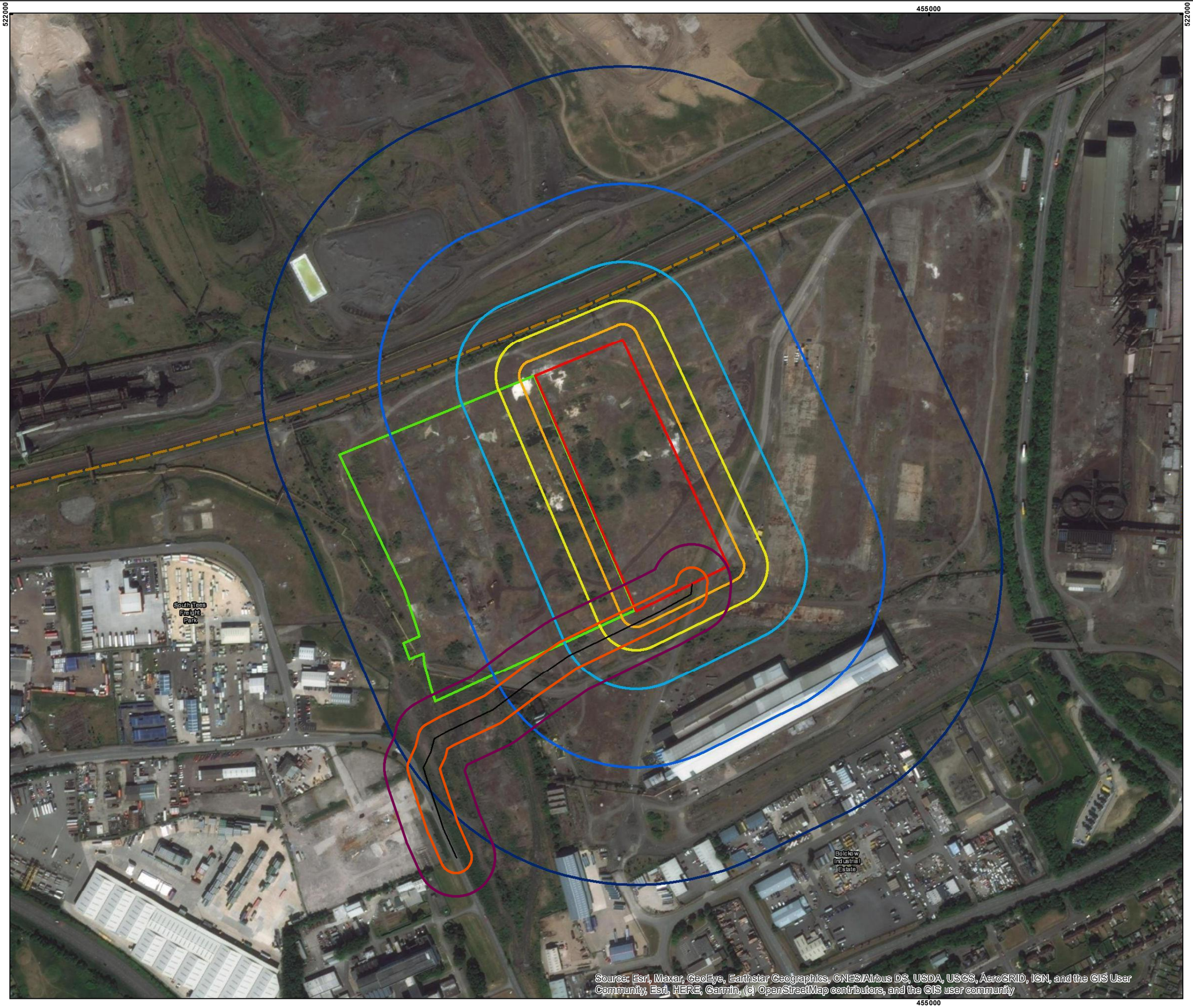

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Legend

- Site Boundary
- TVERF Site Boundary
- England Coast Path

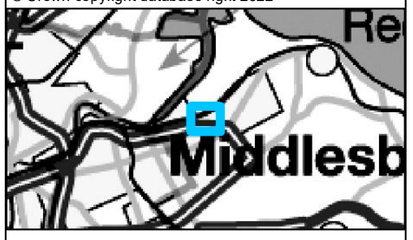
Screening Distance from Trackout Routes

- 20 m trackout buffer
- 50 m trackout buffer

Screening Distance from Site Boundary

- 20 m buffer
- 50 m buffer
- 100 m buffer
- 200 m buffer
- 350 m buffer

Client:	Viridor Waste Limited
Site:	Tees Valley IBA Facility
Project:	3554 Air Quality Assessment
Title:	Figure 1 - Construction Phase Dust Assessment Screening Distances
Drawn by: SMN	Date: 25/02/2022



0 0.045 0.09 0.18 km

Scale: 1:4,500

N

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B Construction Phase Dust Assessment Methodology

B.1 Background

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.

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

1. dust emission magnitude (Table 7); and
2. the sensitivity of the area (Table 8 to Table 13).

These factors are combined to give the risk of dust impacts (Table 14) in the absence of any mitigation measures beyond those required by legislation.

B.2 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:

Table 7: Dust Emission Magnitude Criteria

Magnitude	Description
Demolition Activities	
Large	total building volume > 50,000m^3, potentially dusty construction material (i.e. concrete), on-site crushing and screening, demolition activities > 20m above ground level
Medium	total building volume 20,000 - 50,000m^3, potentially dusty construction material, demolition activities 10 – 20m above ground level

Magnitude	Description
Small	total building volume < 20,000m^3, 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 > 10,000m^2, 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 – 10,000m^2, 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 < 2,500m^2, 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 > 100,000m^3, piling, on site concrete batching, sandblasting
Medium	total building volume 25,000 – 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	total building volume < 25,000m^3, 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

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.

B.3 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 8.

Table 8: 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; and 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 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.

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 9.

Table 9: Sensitivity to Heath Effects of PM10

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

Table 10 provides an example of possible sensitivities of receptors to ecological effects.

Table 10: 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. 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.

Table 11, Table 12 and Table 13 show how sensitivity of the area should be determined for dust deposition, human health and ecosystem impacts respectively. The sensitivity of these is then derived for construction, earthworks and trackout.

Table 11: 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

Table 12: 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	>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	>32µg/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 13: 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

B.4 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 14: 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
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

C Construction Dust Mitigation Measures

The maximum dust emission risk category for the site has been assessed to be 'low risk'. The following mitigation measures are highly recommended for 'low risk' sites in the IAQM guidance. The actual measures to be implemented should be site-specific and confirmed by the construction contractor using professional judgment.

Communications:

- Display the name and contact details of person(s) account-able for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

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 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.
- Avoid site runoff of water or mud.

Operating vehicle/machinery and sustainable travel:

- Ensure all vehicles switch off 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.

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 and 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.

Waste management:

- Avoid bonfires and burning of waste materials.

Highly recommended measures specific to earthworks, construction and trackout:

- None for a ‘low risk’ site.

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