# Appendix A8.3: Construction Risk Assessment

## 1.1 Construction Phase Dust Assessment Methodology

1.1.1 The criteria developed by the Institute of Air Quality Management (IAQM, 2024) for the assessment of air quality impacts arising from construction activities was used as the basis for the assessment methodology discussed in the following sections. The assessment is comprised of five steps as described below.

**Step 1: Identify the need for a Detailed Assessment**

1.1.2 An assessment would normally be required where there is:

- a human receptor within 250m of the proposed scheme; and/or within 50m of the roadside used by the construction vehicles on the public highway, up to a distance of 250m from the construction site entrance(s); and/or
- an ecological receptor within 50m of the proposed scheme and/or within 50m of the roadside used by construction vehicles on the public highway, up to a distance of 250m from the construction site entrance(s).

1.1.3 A human receptor refers to any location where a person or property may experience the adverse effects of airborne dust or dust-soiling, or exposure to particulate matter ($PM_{10}$) over a period relevant to the Air Quality Objectives (AQOs). Although $PM_{2.5}$ is not specifically included as a parameter within the assessment, the risk levels associated with $PM_{10}$ and any subsequent mitigation measures would also apply to $PM_{2.5}$, as $PM_{2.5}$ is included within the $PM_{10}$ fraction.

1.1.4 An ecological receptor refers to any sensitive habitat affected by dust soiling. For locations with a statutory designation, such as a Site of Special Scientific Interest (SSSI), Special Area of Conservation (SACs) and Special Protection Areas (SPAs), consideration should be given as to whether the habitat is sensitive to dust. Some non-statutory sites may also be considered if appropriate, such as a Site of Importance for Nature Conservation (SINC), Local Wildlife Site (LWS) or Ancient Woodland (AW).

1.1.5 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is 'negligible', and any effects would be 'not significant'.

**Step 2: Assess the Risk**

1.1.6 A site is allocated to a risk category on the basis of the scale and nature of the works (Step 2A) and the sensitivity of the area to dust impacts (Step 2B). These two factors are combined in Step 2C to determine the risk of dust impacts before the allocation of mitigation measures. Risks are described in terms of there being a Low, Medium or High risk of dust impacts for each of the four separate potential activities (demolition, construction, earthworks and trackout). Site-specific mitigation may be required, proportionate to the level of risk.

Step 2A: Define the Potential Dust Emission Magnitude

1.1.7 The potential dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium or Large. Table A8.3-1 presents the dust emission criteria outlined for each construction activity.

**Table A8.3-1: Potential Dust Emission Magnitude**

| Construction Activity | Large | Medium | Small |
|---|---|---|---|
| Demolition | Total building volume > 75,000m$^3$, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities > 12m above ground level. | Total building volume 12,000m$^3$ to 75,000m$^3$, potentially dusty construction material, demolition activities 6m to 12m above ground level. | Total building volume < 12,000m$^3$, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities < 6m above ground level, demolition during wetter months. |
| Earthworks | Total site area > 110,000m$^2$, 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 > 6m in height. | Total site area 18,000m$^2$ to 110,000m$^2$, moderately dusty soil type (e.g. silt), 5 to 10 heavy earth-moving vehicles active at any one time, formation of bunds 3m to 6m in height. | Total site area < 18,000m$^2$, soil type with large grain size (e.g. sand), < 5 heavy earth-moving vehicles active at any one time, formation of bunds < 3m in height. |
| Construction | Total building volume > 75,000m$^3$, on site concrete batching, sandblasting. | Total building volume 12,000m$^3$ to 75,000m$^3$, potentially dusty construction material (e.g. concrete), on site concrete batching. | Total building volume < 12,000m$^3$, construction material with low potential for dust release (e.g. metal cladding or timber). |
| Trackout | > 50 Heavy Duty Vehicles (HDV) (> 3.5 tonnes) outward movements[1] in any one day[2], potentially dusty surface material (e.g. high clay | 20 to 50 HDV (> 3.5 tonnes) outward movements[1] in any one day[2], moderately dusty surface material (e.g. high clay content), unpaved | < 20 HDV (> 3.5 tonnes) outward movements[1] in any one day[2], surface material with low potential for dust |

| Construction Activity | Large | Medium | Small |
|---|---|---|---|
| | content), unpaved road length > 100m. | road length 50m to 100m. | release, unpaved road length < 50m. |

1. A vehicle movement is a one-way journey i.e. from A to B and excludes the return journey.
2. HDV movements during a construction project vary over its lifetime. The number of movements is the maximum, not the average.

Step 2B: Define the Sensitivity of the Area

1.1.8 The sensitivity of the area being considered is described as low, medium and high and considers a number of factors:

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

1.1.9 Indicative examples of classification groups for the varying sensitivities of people to dust soiling effects, to the health effects of $PM_{10}$ and the sensitivities of receptors to ecological effects are presented in Table A8.3-2. A judgement is made at the site-specific level where sensitivities may be lower, for example a soft fruit business may be more sensitive to soiling than an alternative industry in the same location. Box 6, Box 7 and Box 8 within the IAQM guidance (IAQM, 2024) outline more detailed guidance for defining sensitivity.

**Table A8.3-2: Indicative Examples of the Sensitivity of Different Types of Receptors**

| Sensitivity of Receptor | Sensitivities of People and Ecological Receptors | | |
|---|---|---|---|
| | Dust Soiling Effects[1] | Health Effects of $PM_{10}$[2] | Ecological Effects[3] |
| High | Dwellings, museums and other culturally important collections, medium and long-term car parks, and car showrooms. | Residential properties, hospitals, schools, and residential care homes. | Locations with an international or national designation and the designated features may be affected by dust soiling (e.g. SAC/SPA/Ramsar). |
| Medium | Parks, places of work. | Office and shop workers not occupationally exposed to $PM_{10}$. | Locations where there is a particularly important plant species, where dust sensitivity is uncertain or unknown. |

| Sensitivity of Receptor | Sensitivities of People and Ecological Receptors | | |
|---|---|---|---|
| | **Dust Soiling Effects[1]** | **Health Effects of $PM_{10}$[2]** | **Ecological Effects[3]** |
| Low | Playing fields, farmland (usually commercially sensitive horticultural), footpaths, short-term car parks and roads. | Public footpaths, playing fields, parks, and shopping streets. | Locations with a local designation where the features may be affected by dust deposition (e.g. local nature reserves, ancient woodlands). |

1. People's expectations would vary depending on the existing dust deposition in the area.
2. This follows the Department for Environment, Food and Rural Affairs guidance as set out in Local Air Quality Management Technical Guidance (LAQM TG(22)) (Defra, 2022). Notwithstanding the fact that the AQOs and limit values do not apply to people in the workplace, such people can be affected to exposure of $PM_{10}$. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. As such, workers have been included in the medium sensitivity category.
3. Only if there are habitats that might be sensitive to dust. A Habitat Regulation Assessment (HRA) of the site may be required as part of the planning process if the site lies close to an internationally designated site i.e. Special Conservation Areas (SACs), Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) (European Commission, 1992) and Ramsar sites.

1.1.10 The IAQM guidance advises consideration of the risk associated with the nearest receptors to construction activities.

1.1.11 Where there are multiple receptors in a single location, a worst-case representative receptor location is considered and the highest risk applicable is allocated.

1.1.12 The receptor sensitivity and distance are then used to determine the potential dust risk for each dust effect for each construction activity as shown in A8.3-3, Table A8.3-4 and Table A8.3-5.

1.1.13 It is noted that distances are to the dust source and so a different area may be affected by trackout than by on-site works.

1.1.14 For trackout, the distances should be measured from the side of the roads used by construction traffic. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50m from the edge of the road.

**Table A8.3-3: Sensitivity of the Area to Dust Soiling Effects on People and Property**

| Sensitivity of Receptor | Number of Receptors | Distance from the source (m)[1,2] | | | |
|---|---|---|---|---|---|
| | | < 20 | < 50 | < 100 | < 250 |
| 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 |

1. Estimate the total number of receptors within the stated distance. Only the highest level of area sensitivity from the table needs to be considered. For example, if there are seven high sensitivity receptors < 20m of the source and 95 high sensitivity receptors between 20m and 50m, then the total of number of receptors < 50m is 102. The sensitivity of the area in this case would be high.
2. For trackout, the distances should be measured from the side of the roads used by construction traffic.

**Table A8.3-4: Sensitivity of the Area to Human Health Impacts**

| Sensitivity of Receptor[1] | Annual Mean $PM_{10}$ Concentrations ($\mu g/m^3$)[2] | Number of Receptors | Distance from the source (m)[1,2] | | | |
|---|---|---|---|---|---|---|
| | | | < 20 | < 50 | < 100 | < 250 |
| High[3] | > 18 | > 100 | High | High | High | Medium |
| | | 10 – 100 | High | High | Medium | Low |
| | | 1 – 10 | High | Medium | Low | Low |
| | 16 – 18 | > 100 | High | High | Medium | Low |
| | | 10 – 100 | High | Medium | Low | Low |
| | | 1 – 10 | High | Medium | Low | Low |
| | 14 – 16 | > 100 | High | Medium | Low | Low |
| | | 10 – 100 | High | Medium | Low | Low |
| | | 1 – 10 | Medium | Low | Low | Low |
| | < 14 | > 100 | Medium | Low | Low | Low |
| | | 10 – 100 | Low | Low | Low | Low |
| | | 1 – 10 | Low | Low | Low | Low |
| Medium | > 18 | > 10 | High | Medium | Low | Low |
| | | 1 – 10 | Medium | Low | Low | Low |
| | 16 – 18 | > 10 | Medium | Low | Low | Low |
| | | 1 – 10 | Low | Low | Low | Low |
| | 14 – 16 | > 10 | Low | Low | Low | Low |
| | | 1 – 10 | Low | Low | Low | Low |

| Sensitivity of Receptor[1] | Annual Mean $PM_{10}$ Concentrations ($\mu g/m^3$)[2] | Number of Receptors | Distance from the source (m)[1,2] | | | |
|---|---|---|---|---|---|---|
| | | | < 20 | < 50 | < 100 | < 250 |
| | < 14 | > 10 | Low | Low | Low | Low |
| | | 1 – 10 | Low | Low | Low | Low |
| Low | - | > 1 | Low | Low | Low | Low |

1. Estimate the total within the stated distance (e.g. the total within 250m and not the number between 100 and 250m), noting that only the highest level of area sensitivity from the table needs to be considered. For example, if there are seven high sensitivity receptors < 20m of the source and 95 high sensitivity receptors between 20 and 50m, then the total of number of receptors < 50m is 102. If the annual mean $PM_{10}$ concentration is 17µg/m$^3$, the sensitivity of the area would be high.
2. Most straightforwardly taken from the national background maps but should also take account of local sources. The values are based on 18µg/m$^3$ being the annual mean concentration at which an exceedance of the 24-hour objective is likely in Scotland. In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties.

**Table A8.3-5: Sensitivity of the Area to Ecological Impacts**

| Sensitivity of Receptor | Distance from the source (m)[2] | |
|---|---|---|
| | < 20 | < 50 |
| High | High | Medium |
| Medium | Medium | Low |
| Low | Low | Low |

1. Only the highest level of area sensitivity from the table needs to be considered.
2. For trackout, the distances should be measured from the side of the roads used by construction traffic.

Step 2C: Define the Risks of Impacts

1.1.15 The dust emission magnitude is then combined with the sensitivity of the area to determine the overall risk of impacts with no mitigation measures applied. The matrices in Table A8.3-6 provide a method of assigning the level of risk for each activity. These can then be used to determine the level of mitigation that is required.

**Table A8.3-6: Risk of Dust Impacts**

| Sensitivity of Receptor | Dust Emissions Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| **Demolition** | | | |
| High | High Risk | Medium Risk | Medium Risk |
| Medium | High Risk | Medium Risk | Low Risk |
| Low | Medium Risk | Low Risk | Negligible |

| Sensitivity of Receptor | Dust Emissions 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 | Medium Risk | Low Risk |
| Low | Low Risk | Low Risk | Negligible |

**Step 3: Site-Specific Mitigation**

1.1.16 Step 3 of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to whether the site is a low, medium or high-risk site. The highest risk category of a site (of all activities being undertaken) is recommended when considering appropriate mitigation measures for the site. Where risk is assigned as 'Negligible', no mitigation measures beyond those required by legislation are required. However, additional mitigation measures may be applied as good practice.

1.1.17 A selection of these measures have been specified for low risk to high risk sites in the IAQM guidance (IAQM, 2024) as measures suitable to mitigate dust emissions from activities.

**Step 4: Determine Significant Effects**

1.1.18 Following Step 2 (definition of the proposed scheme and the surroundings and identification of the risk of dust effects occurring for each activity), and Step 3 (identification of appropriate site-specific mitigation), the significance of the potential dust effects can be determined. The recommended mitigation measures should normally be sufficient to reduce construction dust impacts to a not significant effect.

1.1.19 The approach in Step 4 of IAQM dust assessment guidance has been adopted to determine the significance of effects with regard to dust emissions. The guidance states the following: "*For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'*".

1.1.20 IAQM guidance also states that: "*Even with a rigorous Dust Management Plan (DMP) in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time,*

*and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that with mitigation the effects will be 'not significant''.*

1.1.21 Step 4 of IAQM guidance recognises that the key to the above approach is that it assumes that the regulators ensure that the proposed mitigation measures are implemented. The management plan would include the necessary systems and procedures to facilitate on-going checking by the regulators to ensure that mitigation is being delivered, and that it is effective in reducing any residual effect to 'not significant' in line with the guidance.

## 1.2 Construction Dust Assessment

**Step 1: Identify the Need for a Detailed Assessment**

1.2.1 An assessment of potential demolition, earthworks, and construction and trackout impacts was undertaken in accordance with the IAQM methodology described earlier and as set out in Chapter 8 (Air Quality). Step 1, where the need for a detailed assessment is determined based on the location of receptors within the vicinity of the study area is described below. The assessment area was divided into four A9 Zones (North, Central, Dunkeld & Birnam and South), as presented in Figure 8.4. These Zones relate to construction data provided by the construction team.

Human Health Receptors

1.2.2 There are human receptors within 250m of the study area; therefore, further assessment is required. A count of the 'high' sensitivity relevant human receptors within the specified assessment bands for each phase of the proposed scheme was carried out as recommended in IAQM guidance (IAQM, 2024), the results of which are set out in Table A8.3-7.

**Table A8.3-7: Dust Soiling and Human Health Receptor Count (High Sensitivity Receptors)**

| Construction Activity and Distance to Receptor | Number of Receptors in Zone[1] | | | |
|---|---|---|---|---|
| | North | Central | Dunkeld & Birnam Station | South |
| **Demolition, Earthworks and Construction Activities** | | | | |
| < 20m | 0 | 10 – 100 | 10 – 100 | 10 – 100 |
| < 50m | 0 | > 100 | 10 – 100 | > 100 |
| < 100m | 0 | > 100 | > 100 | > 100 |
| < 250m | 1 – 10 | > 100 | > 100 | > 100 |
| **Trackout** | | | | |
| < 20m | > 100 | > 100 | > 100 | > 100 |

| Construction Activity and Distance to Receptor | Number of Receptors in Zone[1] | | | |
|---|---|---|---|---|
| | North | Central | Dunkeld & Birnam Station | South |
| < 50m | > 100 | > 100 | > 100 | > 100 |

1. Exact counting of the number of 'human receptors' is not required. It is recommended that judgement is used to determine the approximate number of receptors within each distance band (IAQM, 2024).
2. For the purposes of this assessment, trackout activities are assumed to occur along all roads within the entirety of the construction area for all Zones.

Ecological Receptors

1.2.3 Ecological receptors are present within 50m of the study area; therefore, further assessment is required. All of the ecological receptors in this assessment are Ancient Woodlands. These are described within the IAQM guidance, as low sensitivity receptors to ecological effects from dust impacts, as shown in Table 2 (which provides examples of the sensitivities of different types of Receptors).

**Step 2A: Define the Potential Dust Emission Magnitude**

1.2.4 The dust emission magnitudes associated with each construction activity for each Zone, based on construction data provided by the project construction team are presented in Table A8.3-8.

**Table A8.3-8: Dust Emission Magnitudes**

| Construction Activity | Zone | Assumptions | Dust Emission Magnitude |
|---|---|---|---|
| Demolition | North | Considered to be a 'small' dust emission magnitude as there is a very small amount of demolition at relatively low height, irrespective of it being dusty concrete material.<br>▪ Demolition volume assumed to be < 12,000m$^3$.<br>▪ Maximum height of < 6m above ground level.<br>▪ Potentially dust material e.g. concrete.<br>▪ No on-site crushing is expected. | Small |
| | Central | Considered to be a 'small' dust emission magnitude as there is a very small amount of demolition at relatively low height, irrespective of it being dusty concrete material. | Small |

| Construction Activity | Zone | Assumptions | Dust Emission Magnitude |
|---|---|---|---|
| | | ▪ Demolition volume assumed to be < 12,000m$^3$.<br>▪ Maximum height of < 6m above ground level.<br>▪ Potentially dust material e.g. concrete.<br>▪ No on-site crushing is expected. | |
| | Dunkeld & Birnam Station | Considered to be a 'small' dust emission magnitude as there is a very small amount of demolition at relatively low height, irrespective of it being dusty concrete material.<br>▪ Demolition volume assumed to be < 12,000m$^3$.<br>▪ Maximum height of < 6m above ground level.<br>▪ Potentially dust material e.g. concrete.<br>▪ No on-site crushing is expected. | Small |
| | South | Considered to be a 'small' dust emission magnitude as there is a very small amount of demolition at relatively low height, irrespective of it being dusty concrete material.<br>▪ Demolition volume assumed to be < 12,000m$^3$.<br>▪ Maximum height of < 6m above ground level.<br>▪ Potentially dust material e.g. concrete.<br>▪ No on-site crushing is expected. | Small |
| Earthworks | North | Considered to be a 'large' dust emission magnitude owing to the earthworks involving a volume of dusty material being moved across a large site area by a significant number of earth-moving vehicles, requiring bunds of significant height.<br>▪ Total area of earthworks assumed to be 270,000m$^2$.<br>▪ Potentially dusty soil type of granular material with some rock and clay.<br>▪ Maximum number of earth-moving vehicles on site > 10 vehicles. | Large |

| Construction Activity | Zone | Assumptions | Dust Emission Magnitude |
|---|---|---|---|
| | | ▪ Height of bunds > 6m. | |
| | Central | Considered to be a 'large' dust emission magnitude owing to the earthworks involving a volume of dusty material being moved across a large site area by a significant number of earth-moving vehicles, requiring bunds of significant height.<br>▪ Total area of earthworks assumed to be 200,000m$^2$.<br>▪ Potentially dusty soil type of granular material with some rock and clay.<br>▪ Maximum number of earth-moving vehicles on site > 10 vehicles.<br>▪ Height of bunds > 6m. | Large |
| | Dunkeld & Birnam Station | Considered to be a 'medium' dust emission magnitude owing to the earthworks involving a volume of dusty material being moved across a medium site area by a medium number of earth-moving vehicles, irrespective of activities requiring bunds of small height.<br>▪ Total area of earthworks assumed to be 20,000m$^2$.<br>▪ Potentially dusty soil type of granular material with some rock and clay.<br>▪ Maximum number of earth-moving vehicles on site between 5 – 10 vehicles.<br>▪ Height of bunds < 3m. | Medium |
| | South | Considered to be a 'large' dust emission magnitude owing to the earthworks involving a volume of dusty material being moved across a large site area by a significant number of earth-moving vehicles, requiring bunds of significant height.<br>▪ Total area of earthworks assumed to be 500,000m$^2$.<br>▪ Potentially dusty soil type of granular material with some rock and clay.<br>▪ Maximum number of earth-moving vehicles on site > 10 vehicles. | Large |

| Construction Activity | Zone | Assumptions | Dust Emission Magnitude |
|---|---|---|---|
| | | ▪ Height of bunds > 6m. | |
| Construction | North | Considered to be a 'medium' dust emission magnitude due to usage of material with medium potential for dust release (i.e. concrete despite no on-site storage or handling of raw concrete materials) and the medium volume of construction of potentially dusty materials predicted, despite no concrete batching/sand blasting occurring on site.<br>▪ Total construction volume assumed to be between 12,000 – 75,000m$^3$.<br>▪ No on-site concrete batching or sand blasting expected to occur. | Medium |
| | Central | Considered to be a 'medium' dust emission magnitude due to usage of material with medium potential for dust release (i.e. concrete despite no on-site storage or handling of raw concrete materials) and the medium volume of construction of potentially dusty materials predicted, despite no concrete batching/sand blasting occurring on site.<br>▪ Total construction volume assumed to be between 12,000 – 75,000m$^3$.<br>▪ No on-site concrete batching or sand blasting expected to occur. | Medium |
| | Dunkeld & Birnam Station | Considered to be a 'medium' dust emission magnitude due to usage of material with medium potential for dust release (i.e. concrete despite no on-site storage or handling of raw concrete materials) and the medium volume of construction of potentially dusty materials predicted, despite no concrete batching/sand blasting occurring on site.<br>▪ Total construction volume assumed to be between 12,000 – 75,000m$^3$.<br>▪ No on-site concrete batching or sand blasting expected to occur. | Medium |

| Construction Activity | Zone | Assumptions | Dust Emission Magnitude |
|---|---|---|---|
| | South | Considered to be a 'medium' dust emission magnitude due to usage of material with medium potential for dust release (i.e. concrete despite no on-site storage or handling of raw concrete materials) and the medium volume of construction of potentially dusty materials predicted, despite no concrete batching/sand blasting occurring on site.<br>▪ Total construction volume assumed to be between 12,000 – 75,000m$^3$.<br>▪ No on-site concrete batching or sand blasting expected to occur. | Medium |
| Trackout | North | Considered to be a 'large' dust emission magnitude as worst-case owing to there being a large length of unpaved road predicted within the site and a large number of HDVs with very dusty surface materials (sand, silt and clay).<br>▪ Maximum number of HDV outward movements (one way) in a single day is 128 vehicles.<br>▪ Length of unpaved road approximately 1.0km, with the surface considered to be sand, silt and clay; potentially dusty surface materials. | Large |
| | Central | Considered to be a 'large' dust emission magnitude as worst-case owing to there being a large length of unpaved road predicted within the site and a large number of HDVs with very dusty surface materials (sand, silt and clay).<br>▪ Maximum number of HDV outward movements (one way) in a single day is 26 vehicles.<br>▪ Length of unpaved road approximately 1.0km, with the surface considered to be sand, silt and clay; potentially dusty surface materials. | Large |

| Construction Activity | Zone | Assumptions | Dust Emission Magnitude |
|---|---|---|---|
| | Dunkeld & Birnam Station | Considered, on balance, to be a 'medium' dust emission magnitude owing to there being a small number of HDVs and a large length of unpaved road predicted within the site with very dusty surface materials (sand, silt and clay).<br>▪ Maximum number of HDV outward movements (one way) in a single day is 13 vehicles.<br>▪ Length of unpaved road approximately 0.6km, with the surface considered to be sand, silt and clay; potentially dusty surface materials. | Medium |
| | South | Considered to be a 'large' dust emission magnitude as worst-case owing to there being a large length of unpaved road predicted within the site and a large number of HDVs with very dusty surface materials (sand, silt and clay).<br>▪ Maximum number of HDV outward movements (one way) in a single day is 89 vehicles.<br>▪ Length of unpaved road approximately 1.6km, with the surface considered to be sand, silt and clay; potentially dusty surface materials. | Large |

**Step 2B: Define the Sensitivity of the Area**

1.2.5 The sensitivities of the surrounding area to demolition, earthworks, construction and trackout based on the criteria set out in Table A8.3-3, Table A8.3-4 and Table A8.3-5, for each of the identified Zones is displayed in Table A8.3-9.

1.2.6 The national estimated annual mean 2023 mapped background $PM_{10}$ concentrations (Scottish Air Quality, 2024) within the study area are within the range of 6.9 – 7.8µg/$m^3$ i.e. less than 14µg/$m^3$. This is considered a conservative approach.

**Table A8.3-9: Sensitivity of the Surrounding Area**

| Zone | Potential Impact | Sensitivity of the Surrounding Area | | | |
|---|---|---|---|---|---|
| | | Demolition | Earthworks | Construction | Trackout |
| **North** | Dust Soiling | Low | Low | Low | Low |
| | Human Health | Low | Low | Low | Low |
| | Ecological | Low | Low | Low | Low |
| **Central** | Dust Soiling | High | High | High | High |
| | Human Health | Low | Low | Low | Low |
| | Ecological | Low | Low | Low | Low |
| **Dunkeld & Birnam Station** | Dust Soiling | High | High | High | High |
| | Human Health | Low | Low | Low | Low |
| | Ecological | Low | Low | Low | Low |
| **South** | Dust Soiling | High | High | High | High |
| | Human Health | Low | Low | Low | Low |
| | Ecological | Low | Low | Low | Low |

**Step 2C: Define the Risk of Impacts**

1.2.7 Using the dust emission magnitudes for the various activities in Table A8.3-8 and the sensitivity of the area provided in Table A8.3-9, the definition of the risks for each activity, for each Zone are provided in Table A8.3-10 for dust soiling, human health impacts, and ecological impacts.

**Table A8.3-1: Dust Risk at Human Health and Ecological Receptors**

| Zone | Potential Impact | Risk of Dust Impacts | | | |
|---|---|---|---|---|---|
| | | Demolition | Earthworks | Construction | Trackout |
| **North** | Dust Soiling | Negligible | Low | Low | Low |
| | Human Health | Negligible | Low | Low | Low |
| | Ecological | Negligible | Low | Low | Low |
| **Central** | Dust Soiling | Medium | High | Medium | High |
| | Human Health | Negligible | Low | Low | Low |
| | Ecological | Negligible | Low | Low | Low |
| **Dunkeld & Birnam Station** | Dust Soiling | Medium | Medium | Medium | Medium |
| | Human Health | Negligible | Low | Low | Low |
| | Ecological | Negligible | Low | Low | Low |
| **South** | Dust Soiling | Medium | High | Medium | High |
| | Human Health | Negligible | Low | Low | Low |
| | Ecological | Negligible | Low | Low | Low |

**Step 3: Site-Specific Mitigation**

1.2.8 Recommended mitigation measuresTable A8.3-1 A8.3-10 indicate that dust risk from construction activities associated with the proposed scheme have the potential to be Negligible to High for dust soiling, Negligible to Low for human health impacts, and Negligible to Low for ecological impacts. Mitigation measures will be needed to reduce the potential for significant effects of dust emissions in the vicinity of the proposed scheme. The suggested mitigation measures, based on the risk level identified which should be adopted for the proposed scheme, are set out below.

1.2.9 The mitigation measures are those specified in the IAQM guidance (IAQM, 2024) and are suitable to mitigate dust emissions generated by the proposed scheme. Measures such as those specified in the guidance would normally be sufficient to reduce; construction dust nuisance, risk to human health or effects on ecological sites to a 'not significant' effect. These measures are listed in Table A8.3-11 with a statement as to whether they should be applied based on the risk level identified in the dust assessment for the proposed scheme.

1.2.10 For those mitigation measures that are general, the highest risk category should be applied. For example, if the site is Medium risk for earthworks and construction, but a High risk for demolition and trackout, the general measures applicable to a High-risk site should be applied.

1.2.11 The measures to control dust emissions and monitor the effectiveness of the mitigation should be agreed formally with the respective local authority (Perth & Kinross Council) and potentially key stakeholders as part of a DMP which would form part of the Construction Environmental Management Plan (CEMP).

1.2.12 The highest level of risk per Zone is used for mitigation purposes, however, as Dunkeld & Birnam Station is adjacent to the Central Zone with common receptor locations assessed, this should have the highest risk out of both Central and Dunkeld & Birnam Station applied. On this basis mitigation for the Central, Dunkeld & Birnam Station and South Zones should have High risk mitigation, while the North Zone should have low risk mitigation. However, in some cases it was agreed with Transport Scotland to apply high risk site measures across all Zones as a precautionary approach.

**Table A8.3-11: Mitigation Measures Considered for the Proposed Scheme**

Key: H – Highly recommended D – Desirable N – Not required

| Mitigation Measures | High Risk* | Medium Risk | Low Risk** |
|---|---|---|---|
| | *to be applied to Central, Dunkeld & Birnam Station and South Zones<br>**to be applied to North Zone | | |
| **Mitigation For All Sites: Communications** | | | |
| 1) Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. | H | H | N[1] |
| 2) Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. | H | H | H |
| 3) Display the head or regional office contact information. | H | H | H |
| 4) Develop and implement a Dust Management Plan (DMP) which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site in question. | H | H | D |
| **Site management** | | | |
| 5) Record all dust and air quality complaints, identify cause(s), and take appropriate measures to reduce emissions in a timely manner, and record the measures taken. | H | H | H |
| 6) Make the complaints log available to the local authority when asked. | H | H | H |
| 7) Record any exceptional incidents that cause dust/air emissions, either onsite or offsite, and the action taken to resolve the situation in the logbook. Review measures accordingly. | H | H | H |
| 8) Hold regular liaison meetings with other high risk construction sites within 250m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand | H | N | N |

| Mitigation Measures | High Risk* | Medium Risk | Low Risk** |
|---|---|---|---|
| | *to be applied to Central, Dunkeld & Birnam Station and South Zones<br>**to be applied to North Zone | | |
| the interactions of the off-site transport/deliveries which might be using the same strategic road network routes. | | | |
| **Monitoring** | | | |
| 9) Undertake daily on/off site inspections, at nearby receptors (including roads) to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary should be undertaken, with cleaning to be provided if necessary. | H | D | D |
| 10) 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. | H | H | H |
| 11) 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. | H | H | H |
| 12) Agree dust deposition, dust flux, or real-time $PM_{10}$ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction. | H | H | H |
| **Preparing and maintaining the site** | | | |
| 13) Plan site layout so that machinery and dust/odour causing activities are located away from receptors, as far as is possible. | H | H | H |
| 14) Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. | H | H | H |

| Mitigation Measures | High Risk* | Medium Risk | Low Risk** |
|---|---|---|---|
| | *to be applied to Central, Dunkeld & Birnam Station and South Zones<br>**to be applied to North Zone | | |
| 15) Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period. | H | H | D |
| 16) Avoid site runoff of water or mud. | H | H | H |
| 17) Keep site fencing, barriers and scaffolding clean using wet methods. | H | H | D |
| 18) Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on-site. If they are being re-used on-site, cover as described below. | H | H | D[1] |
| 19) Cover, seed or fence stockpiles to prevent wind whipping. | H | H | D[1] |
| **Operating vehicle/machinery and sustainable travel** | | | |
| 20) Ensure all on-road vehicles comply with the requirements of the London Low Emissions Zone and the London NRMM standards, where applicable. | H | H | H |
| 21) Ensure all vehicles switch off engines when stationary - no idling vehicles. | H | H | H |
| 22) Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. | H | H | H |
| 23) Impose and signpost a maximum-speed-limit of 15 mph (surfaced) and 10 mph (unsurfaced) on haul roads and work areas (if long haul routes are required, speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate). | H | D | D |
| 24) Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. | H | N | N |
| 25) Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing). | H | D | N[1] |

| Mitigation Measures | High Risk* | Medium Risk | Low Risk** |
|---|---|---|---|
| | *to be applied to Central, Dunkeld & Birnam Station and South Zones<br>**to be applied to North Zone | | |
| **Operations** | | | |
| 26) 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. | H | H | H |
| 27) Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. | H | H | H |
| 28) Use enclosed chutes and conveyors and covered skips. | H | H | H |
| 29) Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. | H | H | H |
| 30) Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. | H | H | D |
| **Waste management** | | | |
| 31) Avoid bonfires and burning of waste materials. | H | H | H |
| **Measures Specific to Demolition** | | | |
| 32) Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). | H | D | D |
| 33) Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. | H | H | H |
| 34) Avoid explosive blasting, using appropriate manual or mechanical alternatives. | H | H | H |

| Mitigation Measures | High Risk* | Medium Risk | Low Risk** |
|---|---|---|---|
| | *to be applied to Central, Dunkeld & Birnam Station and South Zones<br>**to be applied to North Zone | | |
| 35) Bag and remove any biological debris or damp down such material before demolition. | H | H | H |
| **Measures Specific to Earthworks** | | | |
| 36) Re-vegetate earthworks and exposed areas / soil stockpiles to stabilize surfaces as soon as practicable. | H | D | N |
| 37) Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. | H | D | N |
| 38) Only remove the cover in small areas during work and not all at once. | H | D | N |
| **Measures Specific to Construction** | | | |
| 39) Avoid scabbling (roughening of concrete surfaces) if possible. | H | D | D |
| 40) Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. | H | H | D |
| 41) Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emissions control systems to prevent escape of material and overfilling during delivery. | H | D | N |
| 42) For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust. | D | D | N |
| **Measures Specific to Trackout** | | | |
| 43) Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. | H | H | D |
| 44) Avoid dry sweeping of large areas. | H | H | D |
| 45) Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. | H | H | D |

| Mitigation Measures | High Risk* | Medium Risk | Low Risk** |
|---|---|---|---|
| | *to be applied to Central, Dunkeld & Birnam Station and South Zones<br>**to be applied to North Zone | | |
| 46) Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. | H | H | N |
| 47) Record all inspections of haul routes and any subsequent action in a site logbook. | H | H | D |
| 48) Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. | H | H | N |
| 49) Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). | H | H | D |
| 50) Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permit. | H | H | N |
| 51) Access gates to be located at least 10m from receptors where possible. | H | H | N |
| [1]Agreed with Transport Scotland that this mitigation will be included across all Zones as Project Specific mitigation | | | |

## 1.3 References

Defra and the Devolved Administrations (2022). Local Air Quality Management: Technical Guidance (TG22). Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf (Accessed October 2024).

European Commission (1992). Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701 (Accessed October 2024).

Institute of Air Quality Management (IAQM) (2024). Guidance on the assessment of dust from demolition and construction, v2.2. Available at: https://iaqm.co.uk/guidance/ (Accessed October 2024).

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