Cottam Parkway Railway Station

Construction Dust Risk Assessment

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Lancashire County Council

Cottam Parkway Railway Station

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Contents

1. Introduction

Emissions of dust to air can occur from works associated with the preparation of land (e.g. demolition, land clearing or grading, earth moving and excavation) and during construction. This report sets out the assessment of dust which could potentially be emitted to air from construction activities associated with the Cottam Parkway Railway Station Project (hereafter referred to as 'the Scheme').

This report supports Chapter 8 (Air Quality) of the Environmental Impact Assessment (EIA) Report for the Scheme and outlines a procedure developed by the Institute of Air Quality Management (IAQM) *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2016) (hereafter referred to as 'IAQM guidance') for the assessment of dust-related air quality impacts arising from construction activities.

This assessment is based on information available at the time of writing and may be subject to change as the final design details are developed. However, where required a precautionary approach has been taken and at this stage, it is considered that the information provided is sufficient to identify any likely impacts of dust emissions from activities associated with the construction of the Scheme.

This report is supported by Figure 1 – Construction Dust Risk Assessment Study Areas.

2. Assessment Methodology

2.1 Introduction

Activities carried out on construction sites can give rise to emissions of dust that could cause annoyance or damage to vegetation due to the soiling of surfaces. These activities can also lead to increased short-term and long-term concentrations of fine particulate matter (e.g. PM_{10} and $PM_{2.5}$) at off-site locations which may affect human health, unless the appropriate mitigation measures are implemented. The impacts of dust emissions from works associated with the construction of the Scheme therefore need to be addressed in order to identify the required mitigation measures.

The assessment of dust during construction has been carried out using a qualitative risk-based appraisal with reference to the Scheme in relation to sensitive receptors, the planned process and site characteristics, as described in the IAQM guidance (IAQM, 2016).

Based on the IAQM guidance (IAQM, 2016), the assessment aims to estimate the impacts of both PM_{10} and dust together, through a combined risk-based assessment procedure. The IAQM guidance (IAQM, 2016) provides a methodological framework but notes that professional judgement is required throughout the assessment to determine the risk of impacts and mitigation requirements. Based on the calculated risk level, the IAQM guidance (IAQM, 2016) sets out clear requirements for the recommended mitigation measures, which can be used to lessen the impact of dust during the construction phase of the Scheme. The mitigation measures taken forward from this assessment are to be included in the Code of Construction Practice (CoCP).

It should be noted this assessment does not consider the air quality impacts of exposure to contaminated dust that could arise from the excavation of any contaminated material. 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.

Larger dust particles (greater than 30 µm) make up the greatest proportion of dust emission from mineral workings or earthworks and will largely deposit within 100 m of sources (Scottish Office, 1998). Intermediate sized particles (10 µm- 30 µm) are likely to travel further. PM_{10}, including the smaller $PM_{2.5}$ particulates are reported to make up a smaller proportion (approximately 10%) of dust emitted from most workings and the emissions become diluted as they disperse downwind (Ove Arup and Partners, 1995).

2.2 Potential sources of dust

The temporary and varied nature of construction or other activities which include similar emission sources differentiates them from other fugitive dust sources when it comes to the estimation and control of emissions. The activity usually consists of a series of different operations, each with its own duration and potential for dust generation. Dust emissions from any single site can be expected to have a definable beginning and end but would also vary between the same types of activities. On large sites, the location and scale of potentially dust-generating activities would also vary throughout the works.

There are potentially sensitive locations close to the site boundary of the Scheme (see Figure 1 - Construction Dust Risk Assessment Study Areas), including residential properties and a school. Activities associated with construction of the Scheme have the potential to produce excessive emissions of dust that could be transported towards receptors by the wind. These receptors are close enough to the Scheme that without mitigation measures, they could perceive increases in the rate of dust deposition to property surfaces.

The key potential construction dust emission sources associated with these activities are summarised below. Where possible, these have been assigned into the four categories used for the IAQM dust assessment method (IAQM, 2016) (i.e. demolition, earthworks, construction and trackout[1]). A full description of the Scheme is presented in Chapter 3 of the EIA Report - Description of the Scheme.

Demolition

There are no planned demolition of buildings or structures as part of the Scheme.

Earthworks

Earthworks associated with the Scheme will include site preparation prior to the construction of the new access road and car park, station platforms, buildings and associated infrastructure.

Construction

Activities include construction of the access road and car park, station platforms, buildings and associated infrastructure.

Trackout

Vehicles moving on and around the Scheme would emit exhaust particulate matter and re-suspend loose material on the compound platform surface. There would be the potential for spillage, from transferring material around the sites and from particulates being lifted from open container vehicles by the wind produced by the vehicle movement. Material tracked out on to the local road network on the wheels of site traffic could be re-suspended by passing traffic.

2.3 Baseline conditions

The assessment requires characterisation of the existing conditions regarding PM_{10} concentrations to determine the sensitivity of the area.

As part of the Local Air Quality Management (LAQM) process, Preston City Council carries out regular assessments and monitoring of air quality within its area. The most recent Air Quality Annual Status Report (Preston City Council, 2019) has been reviewed to determine the concentrations of PM_{10} in the vicinity of the site. However, Preston City Council do not monitor PM_{10} within their administrative borough.

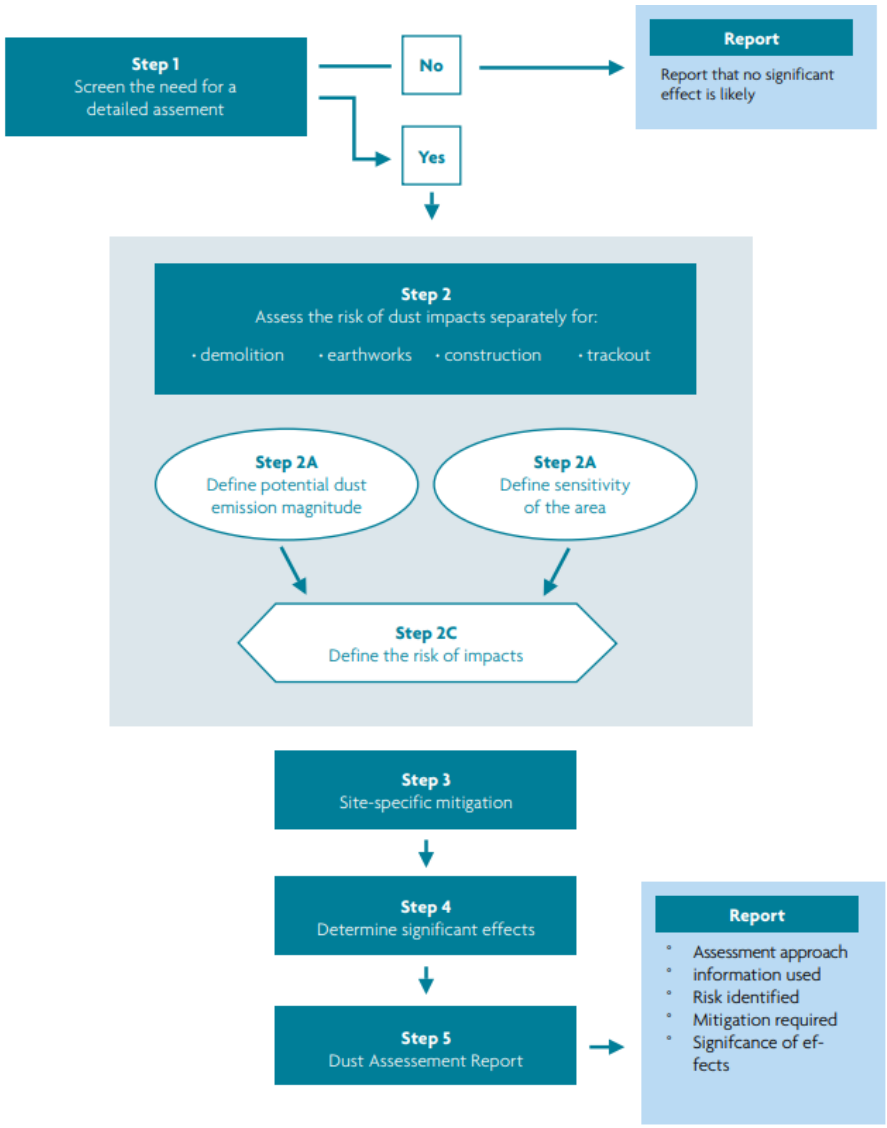
Information on background air quality in the vicinity of the site has been obtained from Defra background map datasets (Defra, 2021). The 2018-based background maps by Defra are estimates based upon the principal local and regional sources of emissions and ambient monitoring data. The PM_{10} concentration obtained from the background map datasets is 10.8 µg/m^3 which is the maximum PM_{10} concentration across the Scheme for 2021.

[1] Trackout refers to the transport of dust and dirt from the sites onto the public road network, where it may be deposited and re-suspended by other vehicles using the road network.

3. IAQM Methodology

The methodology for the assessment of the construction impacts is based on a five-step approach as set out in Figure 2.

Figure 2: Structure of the dust risk assessment (IAQM, 2016)



3.1 Step 1 – Identify the need for a detailed assessment

An assessment would normally be required for a detailed assessment

- A human receptor within 350 m of the Scheme and/or within 50 m of the access route(s) used by construction vehicles on the public highway, up to 50 m from the study area site exit(s) for small sites, up to 200 m from the study area site exit(s) for medium sites and up to 500 m from the study area site exit(s) for large sites; and/or

- An ecological receptor within 50 m of the Scheme and/or within 50 m of the access route(s) used by construction vehicles on the public highway, up to 50 m from the study area site exit(s) for small sites, up to 200 m from the study area site exit(s) for medium sites and up to 500 m from the study area site exit(s) for large sites.

The requirement for a dust risk assessment can be screened out where the above criteria are not met, therefore it can be concluded that the level of risk is Negligible and any impacts would be 'not significant'. If there are human or ecological receptors within the distance criteria set out in Step 1, then Steps 2 to 4 should be undertaken, as shown in Figure 2.

3.2 Step 2 - Assess the risk of dust impacts

A site is allocated to a risk category on the basis of the scale and nature of the works (Step 2A – Define potential dust emission magnitude) and the sensitivity of the area to dust impacts (Step 2B – Define sensitivity of the area). These two factors are combined (Step 2C - Define the risk of dust impacts) to determine the risk of dust impacts before the implementation of mitigation measures. Risks are described in terms of there being a low, medium or high risk of dust impacts for each of four separate potentially dust emitting activities (i.e. demolition, construction, earthworks and trackout). Site-specific mitigation would be required, proportionate to the level of risk identified.

3.2.1 Step 2A - Define the potential dust emission magnitude

The potential dust emission magnitude is based on the scale of the anticipated works and is classified as small, medium or large. Table 1 presents the dust emission criteria outlined for each construction activity.

Table 1: Potential dust emission magnitude

Construction activity	Large	Medium	Small
Demolition	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level.	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10 - 20 m above ground level.	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.
Earthworks	Total site area >10,000 m^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 >8 m in height, total material moved >100,000 tonnes.	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter month.

Construction activity	Large	Medium	Small
Construction	Total building volume >100,000 m^3, on site concrete batching, sandblasting.	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	>50 Heavy Duty Vehicles (HDV) (>3.5t) outward movements[1] in any one day[2], potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.	10-50 HDV (>3.5t) outward movements[1] in any one day[2], moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.	<10 HDV (3.5t) outward movements[1] in any one day[2], surface material with low potential for dust release, unpaved road length <50 m.
Note 1 A vehicle movement is a one-way journey. i.e. from A to B and excludes the return journey. Note 2 HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.			

3.2.2 Step 2B – Define the sensitivity of the area

The sensitivity of the area is described as low, medium or high and takes a number of factors into account:

- 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.

Table 2 presents indicative examples of classification groups for the varying sensitivities of people to dust soiling impacts, to the health impacts of PM_{10} and the sensitivities of receptors to ecological impacts. A judgement is made at the site-specific level where sensitivities may be higher or lower, for example a soft fruit business may be more sensitive to soiling than an alternative industry, such as coal mining, in the same location. Section 7.3 within the IAQM guidance (IAQM, 2016) outlines more detailed parameters for defining sensitivity.

Table 2: Indicative examples of the sensitivity of different types of receptors

Sensitivity of receptor	Sensitivities of people and ecological receptors		
	Dust soiling activities impacts	Heath impacts of PM_{10}	Ecological impacts
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. Special Area of Conservation (SAC)/Special Protection Area (SPA)/Ramsar site). Locations where there is a community of a particular dust sensitive species such as vascular plant species included in the Red Data list for Great Britain (Cheffings *et al*., 2005)
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. Locations with a national designation where the features may be affected by dust deposition (e.g. Site of Special Scientific Interest (SSSI)).
Low	Playing fields, farmland, 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 Reserve (LNR).

Note 1 People's expectations would vary depending on the existing dust deposition in the area.
Note 2 This follows the Department for Environment, Food and Rural Affairs (Defra, 2016) guidance as set out in Local Air Quality Management Technical Guidance (LAQM.TG (16)).
Note 3 A Habitat Regulation Assessment of the site may be required as part of the planning process if the site lies close to an internationally designated site (i.e. SACs/SPAs) designated under the Habitats Directive (92/43/EEC) and Ramsar sites.

The IAQM guidance (IAQM, 2016) advises consideration of the risk associated with the nearest receptors to each phase of work. Where there are multiple receptors in a single location, a worst-case representative receptor location is considered and the highest risk applicable is allocated.

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 Table 3, Table 4 and Table 5. It is noted that distances are between the dust source to the nearest receptor so a different area may be affected by trackout than by on-site works.

For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sized sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Based on the likely scale of HDV activities anticipated, the Scheme is considered a large site for trackout activities. This means an assessment would be required where there is a human receptor within 50 m of the route used by construction vehicles up to 500 m from the site exit(s) (as per the IAQM guidance (IAQM, 2016)).

Table 3: Criteria for the sensitivity of the area to dust soiling effects 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 4: Criteria for the sensitivity of the area to human health

Receptor sensitivity	Annual mean PM_{10} concentrations	Number of receptors	Distance from the source (m)			
			<20	<50	<100	<350
High	>32µg/m^3	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28 - 32µg/m^3	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24 - 28µg/m^3	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32µg/m^3	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28 - 32µg/m^3	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24 - 28µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low

Receptor sensitivity	Annual mean PM_{10} concentrations	Number of receptors	Distance from the source (m)			
			<20	<50	<100	<350
	<24µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

Table 5: Criteria for the sensitivity of the area to ecological impact

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

3.2.3 Step 2C – Define the risk of impacts

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 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 6: Determination of risk of dust impacts

Sensitivity of the area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible risk
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible risk
Construction			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible risk

Sensitivity of the area	Dust emission magnitude		
	Large	Medium	Small
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Low risk	Negligible risk
Low	Low risk	Low risk	Negligible risk

3.3 Step 3 – Site specific mitigation

During the construction phase, it would be important to control dust levels for high, medium and low risk construction activities. In order to avoid significant impacts from dust during the construction phase, suitable mitigation measures should be adopted. Following the identification of the overall risk category for the demolition, earthworks, construction and trackout activities based on Table 6, appropriate mitigation measures can be identified for the Scheme. Activities identified as a high risk would require a greater level of mitigation than those identified as low risk.

A selection of these measures has been specified for low risk to high risk sites in IAQM guidance (IAQM, 2016) as measures suitable to mitigate dust emissions from activities such as those which would be undertaken during the construction of the Scheme.

3.4 Step 4 - Determine significant impacts

Following Step 2 (determining the risk of dust impacts for each activity) and Step 3 (identification of appropriate site-specific mitigation), the significance of the potential dust impacts can be determined. The recommended mitigation measures are considered to be sufficient to reduce emissions of dust based on the successful application of these measures at other large construction sites, such that a significant impact would not occur at off-site receptors.

The approach in Step 4 of IAQM guidance (IAQM, 2016) (Determine significant impacts) has been adopted to determine the significance of impacts with regard to dust emissions. The guidance states the following:

'For almost all construction activity, the aim should be to prevent significant impacts on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

IAQM guidance (IAQM, 2016) also states that:

'Even with a rigorous DMP [Dust Management Plan] 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 impacts will be 'not significant'.

Step 4 of IAQM guidance (IAQM, 2016) 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 enable 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.

4. Construction Dust Risk Assessment

This section sets out the construction dust risk assessment following the five steps described in the methodology section above. The assessment of potential demolition, earthworks, construction and trackout impacts has been undertaken in accordance with the IAQM methodology described earlier and as set out in Chapter 8 (Air Quality).

4.1 Step 1 - Identify the need for a detailed assessment

An assessment of potential construction impacts (i.e. demolition, earthworks, construction and trackout) has been undertaken in accordance with the IAQM methodology (IAQM, 2016) described earlier. The first step is Step 1, where the need for a detailed assessment is determined based on the location of receptors within the vicinity of the Scheme.

There are human receptors (i.e. residential properties, learning centres and commercial premises) within 350 m of the Scheme site boundary and therefore, further assessment is required. There are also human receptors within 50 m of the local road network, up to 500 m from the respective site exit(s), which would be used during the construction works. A count of the relevant human receptors within the specified assessment bands (i.e. up to 20 m, 50 m, 100 m, 200 m and 350 m from the site boundary (see Figure 1 - Construction Dust Risk Assessment Study Areas)) has been carried out as recommended in IAQM guidance (IAQM, 2016), the results of which are set out within this section of the report. The receptors have been identified as being of high, medium or low sensitivity as per the criteria set out in Table 2 and Table 3 (see Box 6 and Box 7 in the IAQM guidance (IAQM, 2016)). Those receptors within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site exit(s) are also presented in Table 7.

The impacts of construction dust on ecological sites have also been considered. Dust can have direct physical impacts including reduced photosynthesis, respiration and transpiration through coating and smothering. The smothering has been found to affect photosynthesis both by shading and also by obstructing diffusion through blocking of the leaf stomata (Environment Agency, 2003). Other direct impacts include altering the pH of the soils or surface water in the ecological site through deposition of dusts with high acidity or alkalinity. This could lead to the loss of certain plants which prefer a specific soil or water chemistry.

Indirect impacts of the dust soiling and smothering can include increased susceptibility of the plant to other stresses, including air pollution or pathogens.

Non-vascular species such as mosses and lichens are considered to be the most sensitive species to dust soiling and smothering as they absorb water and nutrients directly from the air. As these lack a protective cuticle, dust deposited onto their surfaces can act as a desiccant, drying out and damaging their tissues (Meininger & Spatt, 1988). However, there are species of mosses and lichens that are more tolerant to dust deposition (Meininger & Spatt, 1988; Farmer, 1993).

The presence of any ecological receptors within 50m of the site boundary is discussed within this section of the report, together with a description of the ecological site, and its potential sensitivity to dust soiling, in accordance with Step 2B.

4.1.1 Human receptors

The human receptors within the designated assessment bands around the Scheme are set out in Table 7. A figure of the high sensitivity receptors within the assessment bands is presented in Figure 1 – Construction Dust Risk Assessment Study Areas.

As per IAQM guidance (IAQM, 2016), the high sensitivity receptors identified within 350m of the Scheme site boundary presented in Table 7 include an estimated 137 pupils and staff at the nearby Lea Endowed Primary School which is 103m north of the Scheme site boundary at its closest point.

Table 7: Receptor count for the Scheme

Demolition, earthworks and construction		**Receptor count**		
Receptor sensitivity		High	Medium	Low
Distance from the Scheme site boundary	<20 m	1-10	0	0
	<50 m	10-100	0	0
	<100 m	10-100	1-10	1-10
	<200 m	>100	1-10	1-10
	<350 m	>100	1-10	1-10
Trackout		**Receptor count**		
Receptor sensitivity		High	Medium	Low
Distance from the site exit(s) (up to 200 m)	<20 m	1-10	0	1-10
	<50 m	10-100	0	1-10

4.1.2 Ecological receptors

The Lancaster Canal Whole Length in Lancashire Including Glasson Branch Biological Heritage Site (BHS) (Lancaster Canal BHS) flows across the northern aspect of the Scheme and is within 50 m of the local road network up to 500 m from the site exit(s). Therefore, this ecological receptor has been considered in the assessment. The Lancaster Canal BHS citation (Lancashire County Heritage Sites, 2019) notes approximately 250 aquatic and semi-aquatic plants inhabit the length of the canal with the associated embankments and tow paths supporting semi-natural habitats such as grassland and woodland. As per consultation with the project ecologist and in accordance with IAQM guidance (IAQM, 2016), based on the proximity and value of the sites' ecological assets, Lancaster Canal BHS has been classed as a low sensitivity receptor. There are no other ecological receptors within 50 m of the site boundary.

4.2 Step 2 - Assess the risk of dust impacts

4.2.1 Step 2A Define the potential dust emission magnitude

The works associated with the construction of the Scheme would be split into several different elements, which could potentially involve different periods of demolition, earthworks, construction and trackout activities, levels of which would not necessarily peak simultaneously.

The dust emission magnitudes of each activity have been specified using the definitions of dust emission magnitudes presented in Table 1 and professional judgement in line IAQM guidance (see Section 7.2 of the IAQM guidance (IAQM, 2016)).

Demolition

There are no demolition activities planned as there are no existing structures that need to be removed. On this basis, demolition is not considered further in the assessment.

Earthworks

The earthworks activities associated with the Scheme will include the excavation of the new road to a depth of approximately 0.3 m. Additionally, there will be site preparation to facilitate construction of the new car park and station. There is likely to be a large amount of heavy earth-moving equipment activity at any one time (i.e. typically greater than 10 machines). The ground conditions comprise a clay soil which may be prone to suspension when dry and therefore be potentially dusty. Temporary stock piling of soil material will also be required at a height of between 4 and 8 m. The total site area of the Scheme is approximately 118,000 m^2. The total amount of material anticipated to be moved is likely to be between 20,000 - 100,000 tonnes. Based on the site area, potential number of earth moving equipment and clay soil, as a conservative approach, the assessment of earthworks is based on a dust emission class of 'large'.

Construction

Activities include construction of the road and car park comprising approximately 10,000 m^3 of material. Further activities include construction of the associated station buildings and structures. The construction volume of the station is likely to be less than 15,000 m^3. The construction stage would use potentially dusty construction materials such as concrete. The total construction volume is likely to be less than 25,000 m^3 and on-site batching or sandblasting activities are not anticipated. On this basis, the assessment for construction is based on a dust emission class of 'medium'.

Trackout

The maximum number of daily outward movements of HDVs on to the public road network is anticipated to be between 10 and 50 in any one day and unpaved road(s) are likely to be greater than 100 m in length. The surface material may be potential dusty (i.e. high clay content). On this basis the assessment for trackout is based on a dust emission class of 'large'.

Summary of dust emission magnitudes

Table 8 presents the dust emission magnitude for each activity based on the criteria set out in IAQM guidance (IAQM, 2016).

Table 8: Dust emission magnitude for the Scheme

Receptor sensitivity	Dust emission magnitude
Demolition	Not applicable
Earthworks	Large
Construction	Medium
Trackout	Large

4.2.2 Step 2B Define the sensitivity of the area

The area surrounding the Scheme is primarily agricultural in nature with sporadic residential properties in close proximity to the Scheme site boundary. Lea Endowed Primary School is approximately 100 m north of the Scheme site boundary at its closest point.

Table 9 displays the sensitivities of the surrounding area to demolition, earthworks, construction and trackout based on the criteria set out in Table 1 and Table 2, numbers of receptors within certain distance bands of the site boundary around the Scheme and existing PM_{10} concentrations. The IAQM guidance (IAQM, 2016) recommends that the receptor distance is based on the distance from the source rather than the site boundary. This assessment has been undertaken on the basis that all activities (i.e. earthworks, construction and trackout) take place at the Scheme site boundary. This represents a conservative assumption as in practice most activities would not take place at the site boundary, thus increasing the distance between the source and the receptor.

Table 9 also displays the sensitivities of the assessed Lancaster Canal BHS to earthworks, construction and trackout activities based on the proximity and the value of the sites' ecological assets in line with IAQM guidance (IAQM, 2016).

Table 9: Sensitivity of the area for human receptors and Lancaster Canal BHS

Site	Potential impact	Sensitivity of the surrounding area			
		Demolition	Earthworks	Construction	Trackout
Scheme	Dust soiling	Not applicable	Medium	Medium	Medium
	Human health		Low	Low	Low
	Lancaster Canal BHS		Low	Low	Low

Table 9 shows that, based on the number of receptors within proximity of the Scheme, the sensitivity of the area for dust soiling impacts is medium for all stages of the Scheme. Based on the number of receptors in proximity of the Scheme and the background PM_{10} concentration applied (i.e. 10.8 µg/m^3), the sensitivity of the area for human health impacts is categorised as low for all stages of the Scheme.

For the assessed ecological receptor, the sensitivity of Lancaster Canal BHS is categorised as low for all stages of the Scheme.

4.2.3 Step 2C Define the risk of impacts

Using the dust emission magnitudes for the various activities in Table 8 and the sensitivity of the area provided in Table 9 the risks associated with the Scheme are provided in Table 10 for dust soiling and human health impacts.

Table 10: Dust risk at human and receptors and Lancaster Canal BHS

Site	Potential impact	Demolition	Earthworks	Construction	Trackout
Scheme	Dust soiling	Not applicable	Medium risk	Medium risk	Medium risk
	Human health		Low risk	Low risk	Low risk
	Lancaster Canal BHS		Low risk	Low risk	Low risk

The results in Table 10 indicate that for potential dust soiling impacts, there is predicted to be a medium risk from earthworks, construction and trackout activities. For potential human health impacts, there is predicted to be a low risk from all other stages of the Scheme.

It would therefore be necessary to adopt an appropriate level of good practice mitigation measures to reduce the risks of causing a significant effect to amenity or human health. This would also prevent or reduce potential dust or PM_{10} (and $PM_{2.5}$) emissions which are associated with health impacts such as exacerbating existing health conditions including asthma and other lung conditions.

For the assessed Lancaster Canal BHS, the results in Table 10 indicate that there would be a negligible to low risk from the dust generating activities discussed.

4.2.4 Step 3 Scheme – specific mitigation

Recommended mitigation measures

The results in Table 10 indicate that there is a medium risk for dust soiling impacts at sensitive human receptors and a low risk for human health impacts and ecological impacts.

Good practice mitigation measures would be needed to reduce the potential for dust emissions to lead to significant impacts in the vicinity of the Scheme. The suggested good practice mitigation measures which should be adopted for the Scheme are set out below.

The mitigation measures have been derived from those specified in the IAQM guidance (IAQM, 2016) and where possible at this stage, adapted to the activities associated with construction of the Scheme. Measures such as those specified in the guidance would normally be sufficient to reduce construction dust nuisance and risks to human health to a 'not significant' effect. These measures are listed in Table 11 to Table 15 with a recommendation as to whether or not they should be applied based on the risk levels identified in the dust assessment. Some specific comments or observations have been added or amendments to the text undertaken, where appropriate.

The general mitigation measures were specified based on the highest risk category (i.e. based on the medium risk to human receptors from dust soiling) as recommended by IAQM guidance (IAQM, 2016).

As specified above, the measures to control dust emissions taken forward from this assessment, derived from the highly recommended or desirable measures (see Table 11 to Table 15) and the monitoring of the effectiveness of the mitigation, would be included in the air quality management strategies set out in the CoCP.

When applying the mitigation measures, IAQM guidance (IAQM, 2016) states the following:

"The most important aspects of the Dust Management Plan are assigning responsibility for dust management to an individual member of staff of the principal contractor, training staff to understand the importance of the issue, and communicating with the local community. Good dust management practices implemented at high risk sites have resulted in no or minimal complaints, which illustrates the value of the recommended approach."

The mitigation measures set out in Table 11 to Table 15 do not specifically include assigning responsibility for dust management to a staff member or training staff on the importance of dust management and awareness of dust issues. These would be included within the proposed mitigation measures.

Table 11: Mitigation for the Scheme, communications

Mitigation measure	**Highly recommended/Desirable/Not required**
1. Develop and implement a stakeholder communications plan that includes community engagement before work commences on the Scheme.	Highly recommended
2. Display the name and contact details of person(s) accountable for air quality and dust issues on the Scheme. This may be the environment manager/engineer or the site manager.	Highly recommended
3. Display the head or regional office contact information.	Highly recommended
4. Develop dust mitigation and control measures as part of the air quality management strategies as set out in the CoCP. This may also include measures to control other pollutant emissions. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this assessment.	Highly recommended
Site management	
5. 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.	Highly recommended
6. Make the complaints log available to the local authority when asked.	Highly recommended
7. Record any exceptional incidents that cause dust and/or air emissions, either on-site or off-site, and the action taken to resolve the situation in the logbook.	Highly recommended
8. Hold regular liaison meetings with other high-risk construction sites within 500 m of the Scheme, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	Not required

Mitigation measure	Highly recommended/Desirable/Not required
Monitoring	
9. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust and 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 100 m of the site boundary, with cleaning to be provided if necessary.	Desirable
10. Carry out regular site inspections to monitor compliance with the CoCP, record inspection results and make an inspection log available to the local authority when asked.	Highly recommended
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.	Highly recommended
12. Agree dust deposition, dust plant or real-time PM_{10} continuous monitoring locations with the local authority. Further guidance is provided by IAQM (IAQM, 2018) on monitoring during earthworks and construction (see Section 4.2.5).	Highly recommended
Preparing and maintaining the site	
13. Plan site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible.	Highly recommended
14. Erect solid screens or barriers around dusty activities, or the site boundary, which are at least as high as any stockpiles on-site.	Highly recommended
15. Fully enclose site or specific operations where there is a high potential for dust production and the site boundary is active for an extended period.	Highly recommended
16. No discharge of site runoff to ditches, watercourses, drains, sewers or soakaways without consultation of the appropriate authorities.	Highly recommended
17. Keep the site fencing, barriers and scaffolding clean using wet methods.	Highly recommended
18. Remove materials that have a potential to produce dust from the site as soon as possible, unless being re-used on-site. If they are being re-used on-site, cover as described below.	Highly recommended
19. Cover, seed or fence stockpiles to prevent wind-whipping as soon as is reasonably practicable following completion of earthworks.	Highly recommended

Mitigation measure	Highly recommended/Desirable/Not required
Operating vehicles/machinery and sustainable travel	
20. Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London non-road mobile machinery (NRMM) standards, where applicable.	Not applicable
21. Ensure all vehicles switch off engines when stationary- no idling vehicles.	Highly recommended
22. Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	Highly recommended
23. Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Desirable
24. Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Highly recommended
25. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car sharing) and stipulates the avoidance of HDV movements through Air Quality Management Areas where practicable.	Desirable
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.	Highly recommended
27. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	Highly recommended
28. Use enclosed chutes and conveyors (including transfer points) and covered skips.	Highly recommended
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.	Highly recommended
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.	Highly recommended
44. Avoid dry sweeping of large areas.	Highly recommended

Mitigation measure	Highly recommended/Desirable/Not required
46. Inspect on-site haul routes for integrity and instigate any necessary repairs to the surface as soon as reasonably practicable.	Highly recommended
47. Record all inspections of haul routes and any subsequent action in a site logbook.	Highly recommended
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers, and regularly cleaned.	Highly recommended
Waste management	
31. Avoid bonfires and burning of waste materials	Highly recommended

Table 12: Measures specific to demolition

Mitigation measure	Highly recommended/Desirable/Not required
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).	Not applicable
33. Ensure effective water suppression is used during demolition operations. Hand-held spays 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.	Not applicable
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Not applicable
35. Bag and remove any biological debris or damp down such material before demolition.	Not applicable

Table 13: Measures specific to earthworks

Mitigation measure	Highly recommended/Desirable/Not required
36. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Desirable
37. Use hessian fabric, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	Desirable
38. Only remove the cover in small areas during work and not all at once.	Desirable

Table 14: Measures specific to construction

Mitigation measure	Highly recommended/Desirable/Not required
39. Avoid scabbling (roughening of concrete surfaces) if possible.	Desirable
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.	Highly recommended
41. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Desirable
42. For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.	Desirable

Table 15:Measures specific to trackout

Mitigation measure	Highly recommended/Desirable/Not required
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.	Highly recommended
45. Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport.	Highly recommended
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Highly recommended
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 permits.	Highly recommended

4.2.5 Air quality monitoring

As the works associated with construction of the Scheme have been categorised as a medium risk, an appropriate monitoring survey, as recommended in Table 11, would be undertaken to form a key part of the overall dust mitigation and management process. The approach and scope of the air quality monitoring survey would be informed by the IAQM Guidance on *Air Quality Monitoring in the Vicinity of Demolition and Construction Sites* (IAQM, 2018) and would likely include dust deposition monitoring using passive dust deposition gauges. Supplementary monitoring of weather conditions including wind speed, wind direction and rainfall would be undertaken.

The IAQM monitoring guidance (IAQM, 2018) states:

'Monitoring may be carried out in order to fulfil a number of objectives:

- *Ensure that the construction activities do not give rise to any exceedances of the air quality objectives/limit values for PM_{10} and/or $PM_{2.5}$, or any exceedances of recognised threshold criteria for dust deposition/soiling;*
- *Ensure that the agreed mitigation measures to control dust emissions are being applied and are effective;*
- *To provide an 'alert' system with regard to increased emissions of dust, and a trigger for cessation of site works or application of additional abatement controls;*
- *To provide a body of evidence to support the likely contribution of the site works in the event of complaints; and*
- *To help to attribute any high levels of dust to specific activities on-site in order that appropriate action may be taken.'*

Although the proposed monitoring system will not provide a real-time 'alert' system, the results of the dust deposition monitoring (based on the monthly dust deposition sampling results) would be reviewed to identify if the agreed thresholds have been exceeded, and if investigation and additional mitigation is required to reduce dust emissions from site activities (or even if site activities needs to be altered or temporarily suspended).

The scope of the monitoring discussed in this section and the basis for setting appropriate thresholds for identifying potentially unacceptable dust soiling at human receptors would be included as part of the air quality management strategy set out in CoCP.

4.2.6 Step 4 – Determine significant impacts

This assessment has identified that there are potentially sensitive dust receptors located in close proximity to the Scheme (see Figure 1 - Construction Dust Risk Assessment Study Areas), including residential properties and a school. There are numerous high and medium sensitivity receptors located within 100 m of the Scheme site boundary (see Table 7). The receptor locations are reported from the Scheme site boundary and not the actual location of activities with the potential to generate dust, and the distances used in the assessment are therefore cautious, as activities with high potential to generate dust (including PM_{10} and $PM_{2.5}$) would be offset from the Scheme site boundary. The sensitivity of the area, which takes into consideration the number and distance of receptors from the site and baseline conditions, are summarised in Table 9 as being low sensitivity with respect to emissions of PM_{10} and $PM_{2.5}$ and medium sensitivity with respect to changes in dust deposition rates and associated impacts on amenity. For the assessed Lancaster Canal BHS, based on the proximity and the value of the sites' ecological assets, it is considered a low sensitivity receptor with regard to dust deposition.

Based on the matrix of relationships between sensitivity of the area and the dust emission magnitude, it is considered that the proposed earthworks, construction and trackout activities for the Scheme are predicted to be a low to medium risk for potential dust soiling impacts at human receptors (see Table 10). There is the potential for infrequent, short-term episodes when baseline dust deposition rates could be increased by an amount that residents could perceive. With regard to human health, there is a negligible to low risk as there is limited potential for emissions of PM_{10} and $PM_{2.5}$ to increase baseline concentrations to a value that is above the air quality objective values set for the protection for human health. At the Lancaster Canal BHS, there is predicted to be a negligible to low risk from the proposed dust generating activities.

The adoption of good practice dust mitigation measures to manage the generation of emissions at source would therefore be required and proposed in the CoCP which, would be used by the contractor to develop a Construction Environmental Management Plan (CEMP) or equivalent management plan to be agreed with the relevant local planning authority prior to construction commencing (usually required as a condition of the planning permission).

The Scheme encompasses a large area but is not unusual in scale in comparison with other major infrastructure schemes. There are mitigation methods already available that have been successfully applied to other developments to manage emissions of dust so that significant off-site impacts have not occurred. Such measures are considered to be no more than normal good practice that would be adopted by any contractor meeting the requirements of the CoCP. It is considered that there are no dust-generating activities proposed that could not be managed using normal good practices (IAQM, 2016) so as to prevent significant effects at any off-site receptor, including those located within 20 m of the Scheme site boundary.

IAQM guidance (IAQM, 2016) notes that with the application of good practice mitigation measures of the type available for use on the Scheme, the environmental impact would not be significant at any off-site receptor. IAQM guidance (IAQM, 2016) also notes that, even with a rigorous package of mitigation measures in place, such as those taken forward from this assessment and included as part of the CoCP which would be adopted by the contractor as part of a CEMP or equivalent, occasional impacts may occur. The CEMP or equivalent would provide a framework by which the level of mitigation is adapted to respond proactively to the changing risk of dust emissions, so that significant impacts are prevented.

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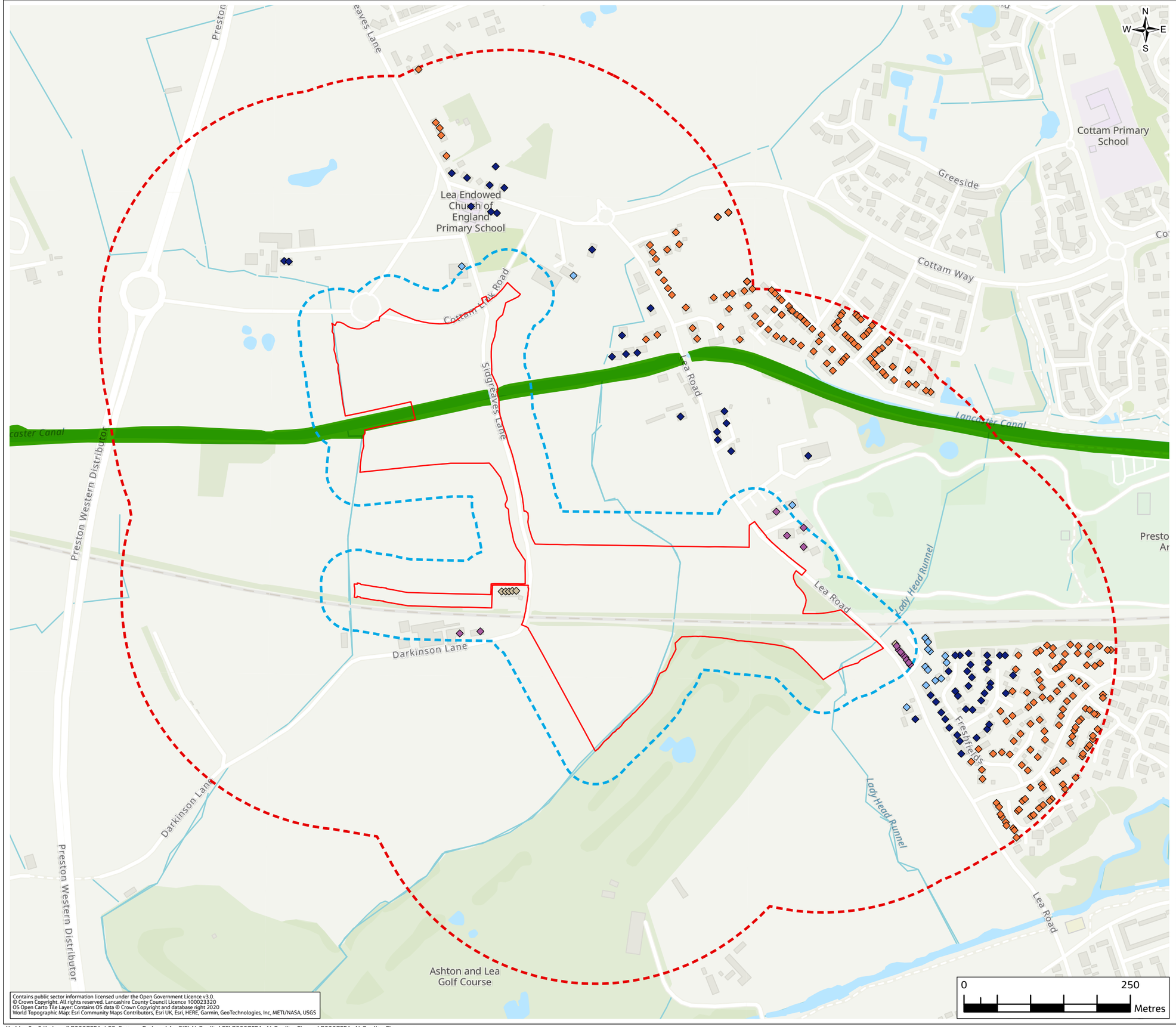
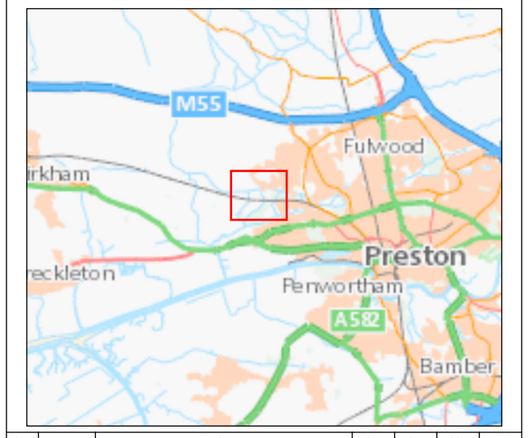
6. Figures

FIGURE 1





Legend

- Site Boundary
- Study Area for Ecological Receptors (50 m from the Site Boundary)
- Study Area for Human Receptors (350 m from the Site Boundary)
- Biological Heritage Site (BHS)

Distance of High Sensitivity Human Receptors from Site Boundary

- 0-20m
- 20-50m
- 50-100m
- 100-200m
- 200-350m

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P03	JUN 2022	Final Issue	RW	DH	SBY	KS
P02	OCT 2021	Comments following client review	RW	DH	SBY	PH
P01	OCT 2021	Initial Issue	MS	DH	SBY	PH

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Project: COTTAM PARKWAY RAILWAY STATION

Drawing Title: CONSTRUCTION DUST RISK ASSESSMENT STUDY AREAS

Drawing Status: FINAL

Scale @ A3	1:5,500	DO NOT SCALE
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