



Wylfa Newydd Project

6.6.13 ES Volume F - Park and Ride App F5-1
- Construction Dust Assessment - Park and
Ride Facility at Dalar Hir

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1 Executive Summary

- 1.1.1 Major construction sites can give rise to increased long-term and short-term particulate matter concentrations at off-site locations, and may also cause annoyance to people and damage to vegetation due to the soiling of surfaces by dust, unless the appropriate mitigation measures are implemented. The effects of dust from activities associated with the construction of the Park and Ride Facility at Dalar Hir (hereafter referred to as the 'Park and Ride') have therefore been evaluated in this assessment.
- 1.1.2 The results of the dust assessment indicate that at sensitive human receptors all activities are predicted to be either a Low or Negligible risk for potential human health impacts. For potential dust soiling impacts, there is predicted to be a Low risk from earthworks and trackout activities and a Negligible risk from demolition and construction activities.
- 1.1.3 As per Institute of Air Quality Management (IAQM) guidance [RD1], the absence of any relevant ecological sites within 50m of the Park and Ride site boundary (as represented by the Order Limits – see figure 9-1) or within 50m of the route(s) used by construction vehicles up to 500m from the site entrance(s), meant the potential effects of construction dust on ecological sites were not required to be considered further.
- 1.1.4 Based on experience of the application of existing mitigation methods at other major construction sites, it is considered that all Low risk dust risk activities identified can be managed through the adoption of a suite of good practice mitigation measures and a monitoring programme to monitor the effectiveness of their application at reducing off-site impacts.
- 1.1.5 The measures taken forward from this assessment to control dust emissions and monitor the effectiveness of the mitigation are included as part of the air quality management strategies set out in the Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6) and the Park and Ride sub-CoCP (Application Reference Number: 8.10).
- 1.1.6 IAQM guidance [RD1] notes that with the application of good practice mitigation measures of the type available for use on this project, the environmental effect will not be significant at any off-site receptor. IAQM guidance [RD1] 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 air quality management strategy set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6), occasional impacts may occur. The Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10) provides a framework by which the level of mitigation is adapted to respond proactively to the changing risk of dust emissions, so that significant effects are prevented.
- 1.1.7 The appraisal of the potential dust emissions from activities associated with the construction of the Park and Ride show that dust is likely to be generated from site activities and there would be a Low risk of impacts to human receptors. However, it is considered that all risks can be effectively

managed through the application of appropriate good practice mitigation measures. Therefore, it is concluded that this work is not likely to generate unacceptable dust impacts to receptors and the effect would be described as not significant.

2 About this report

2.1 Purpose and applicability

- 2.1.1 Emissions of dust to air can occur from works associated with the preparation of land (e.g. demolition, land clearing or grading, and earth moving and excavation) and during construction. This report sets out the assessment of dust which could potentially be emitted to air from the activities associated with the construction of the Park and Ride.

2.2 Terms and definitions

Table 2-1 Terms and definitions

Term		Definition
A5025 Highway Improvements	Off-line	Highway improvements that involve the construction of new sections of the A5025. These would involve the construction of new junctions, new sections of road to bypass local communities, and localised bend improvements generally beyond the existing highway boundaries.
A5025 Highway Improvements	On-line	Highway improvements that are made to the existing A5025 road, generally within the existing highway corridor. The A5025 On-line Highway Improvements are being consented under a separate Town and Country Planning Act 1990 (TCPA) application. The improvements are to be made between the A5 east of Valley Junction to the proposed Power Station Access Road Junction, to include reconstruction and localised widening of the existing pavement and application of a surface dressing. The proposals also comprise a temporary Construction Compound including a temporary pavement recycling facility, and other associated works such as drainage infrastructure, boundary treatments, planting, new signage and road markings.
Abnormal Loads (AILs)	Indivisible	A load that cannot be divided for the purpose of being carried on a road without undue expense or risk of damage.
Alternative Emergency Control Centre (AECC)		A component of the Off-site Power Station Facilities which provides back-up command and communications facilities that would be used to manage an incident at the Power Station Site in the extremely unlikely event that the primary facilities on the Power Station Site were not available.

Term		Definition
Annoyance (dust)		Loss of amenity due to dust deposition or visible dust plumes, often related to people making complaints, but not necessarily sufficient to be a legal nuisance.
Associated Development		Works included in the DCO which facilitate the delivery of the NSIP, and which include: the Site Campus; Park and Ride; Logistics Centre; and the A5025 Off-line Highway Improvements.
Construction		Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. The term 'structure' is defined to include a road, bridge, pipeline, building etc.
Cooling System	Water	The once-through system that removes, using Cooling Water, the proportion of heat energy produced by the Units which cannot be converted into electricity, and includes the intakes, pumphouses, breakwaters, seal pits and outfall structures as well as connecting pipelines and tunnels for each Unit.
Demolition		Any activity involved with the removal of an existing structure (or structures). This may also be referred to as deconstruction, specifically when a building is to be removed a small part at a time.
Deposited dust		Dust that is no longer in the air and which has settled onto a surface. Deposited dust is also sometimes called amenity dust or nuisance dust, with the term nuisance applied in the general sense rather than the specific legal definition.
Development Consent (DCO)	Order	The consent for an NSIP required under Section 37 of the Planning Act 2008.
Dust		Solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air. The terms dust and particulate matter (PM) are often used interchangeably, although in some contexts one term tends to be used in preference to the other. In this assessment the term 'dust' has been used to include the particles that give rise to soiling, and to human health (i.e. PM ₁₀ or PM _{2.5}) and ecological effects. Note: this is different to the definition given in BS 6069-2:1994, where dust refers to particles up to 75µm in diameter [RD2].
Earthworks		Covers the processes of soil-stripping, ground-leveilling, excavation and landscaping.

Term	Definition
Effects	The consequences of the changes in airborne concentrations and/or dust deposition for a receptor. These might manifest themselves as annoyance due to an increase in the dust deposition rate, increased health effects due to exposure to PM ₁₀ or PM _{2.5} or plant dieback due to reduced photosynthesis. The term 'significant effect' has a specific meaning in Environmental Impact Assessment regulations. The opposite is a 'not significant effect'. In the context of construction impacts, any effect will usually be adverse; however, professional judgement is required to determine whether this adverse effect is significant based on the evidence presented.
Enabling Works	Works comprising the A5025 On-line Highway Improvements and Site Preparation and Clearance Proposals which are being consented under the TCPA.
Environmental Impact Assessment (EIA)	The process through which the likely significant effects of a development on the environment are identified and assessed.
Environmental Survey Laboratory (ESL)	A component of the Off-site Power Station Facilities that performs a normal operating function for environmental monitoring and, as such, would contain facilities such as monitoring equipment to conduct radiological surveys in the local area.
Heavy Duty Vehicle (HDV)	Heavy duty vehicles include a vehicle with a gross weight of more than 3.5 tonnes and buses.
Impacts	The changes in airborne concentrations and/or dust deposition. A scheme can have an 'impact' on airborne dust without having any 'effects', for instance if there are no receptors to experience the impact.
Logistics Centre	A temporary secure facility from where deliveries to the Power Station Site during construction would be managed to reduce traffic on and impacts to the local road network.
Main Construction	Construction activities within the Wylfa Newydd Development Area that would result in the completion of the Power Station, including final levelling and deep excavations for the Power Station foundations, civil construction activities, commissioning of both Units and site finishing.

Term	Definition
Marine Off-Loading Facility (MOLF)	A facility comprising three purpose built quays: one mainly for the delivery of large construction components including AILs, and two mainly for bulk materials such as aggregates and cement.
Mobile Emergency Equipment Garage (MEEG)	A component of the Off-site Power Station Facilities which would provide managed storage of vehicles and equipment for responding to any incidents that might arise during the operational phase of the Power Station.
Nationally Significant Infrastructure Project (NSIP)	A type of project listed in the Planning Act 2008, which must be consented by a DCO. These include proposals for power plants, large renewable energy projects, new airports and airport extensions and major road projects.
Non-road mobile machinery	Any mobile machine, item of transportable industrial equipment, or vehicle – with or without bodywork – that is not intended for carrying passengers or goods on the road and is installed with an internal combustion engine.
Nuisance	The term nuisance dust is often used in a general sense when describing amenity dust. However, this term also has specific meanings in environmental law: (a) statutory nuisance, as defined in S79(1) of the Environmental Protection Act 1990 (as amended); (b) private nuisance, arising from substantial interference with a person's enjoyment and use of their land; and (c) public nuisance, arising from an act or omission that obstructs, damages or inconveniences the rights of the community. Each of these applies in as far as the nuisance relates to the unacceptable effects of emissions. It is recognised that a significant loss of amenity may occur at lower levels of emission than would constitute a statutory nuisance.
Off-site Power Station Facilities	Comprising the AECC, ESL and MEEG.
Park and Ride	A temporary facility where workers could park their vehicles securely and transfer to shuttle buses, which would take them to the Power Station Site. The site is designed to include a zone for buses to collect and drop off passengers, with a management office and parking for staff (working at the Park and Ride).

Term	Definition
Particulate Matter (PM)	Airborne particulate matter is made up of a collection of solid and/or liquid materials of various sizes that range from a few nanometres in diameter (about the size of a virus) to around 100 microns (about the thickness of a human hair).
Planning Act 2008	The Planning Act 2008 is the primary legislation that establishes the legal framework for applying for, examining and determining DCO applications for NSIPs.
PM ₁₀	Particulate matter with an aerodynamic diameter of 10 microns or less.
PM _{2.5}	Particulate matter with an aerodynamic diameter of 2.5 microns or less.
Power Station	The proposed new nuclear power station at Wylfa, including two UK Advanced Boiling Water Reactors, the Cooling Water System, supporting facilities, buildings, plant and structures, radioactive waste and spent fuel storage buildings and the Grid Connection.
Power Station Site	The indicative areas of land and sea within which the majority of the permanent Power Station, Marine Works and other on-site development would be situated.
Receptor	A location that may be affected by dust emissions during demolition and construction. Human receptors include locations where people spend time and where property may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust.
Risk	The likelihood of an adverse event occurring.
Site Campus	A temporary facility that would house up to 4,000 construction workers in modular type accommodation blocks, providing an independent living space for each worker, with shared campus-style amenities.
Site of Special Scientific Interest (SSSI)	Site designated as being of special interest for its flora, fauna or geological or physiographical features and protected under the Wildlife and Countryside Act 1981.
Site Preparation and Clearance Proposals (SPC Proposals)	The SPC works and associated proposals for methods of working and temporary road closures. The SPC Proposals will be consented under the TCPA and also form part of the DCO application.

Term	Definition
Site Preparation and Clearance Works (SPC Works)	The SPC works carried out to prepare the Wylfa Newydd Development Area for Main Construction, including site establishment, soil remediation, erection of fencing, habitat clearance, demolition and diversion of a watercourse.
Special Area of Conservation (SAC)	An area which has been identified as being important for a range of vulnerable habitats, plant and animal species within the European Union and are designated under the Habitats Directive.
Sub-Code of Construction Practice (sub-CoCP)	A certified document which sets site-specific commitments to mitigate the effects identified in the Environmental Statement and other assessments. There are 6 sub-CoCPs for the Wylfa Newydd Project including: • Main Power Station Site sub-CoCP; • Marine Works sub-CoCP • Off-Site Power Station Facilities sub-CoCP; • Park and Ride facility sub-CoCP; • Logistics Centre sub-CoCP; and • A5025 Off-line sub-CoCP.
Town and Country Planning Act 1990 (TCPA)	The Act that forms part of the land use planning regime in the UK and (among other things) establishes the legal framework in respect of applications for, and determination of, planning permissions.
Trackout	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when HDVs leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on-site.
UK Advanced Boiling Water Reactor (UK ABWR)	The UK ABWR derives from the generic design of the ABWR. The standard design of the first ABWRs (Kashiwazaki-Kariwa units 6 & 7 in Japan) together with improvements and optimisation from subsequent ABWR plants (Ohma and Shimane 3) and implementation of learning from the Fukushima-Daichii represent the reference plant for the Power Station.
Wildlife Site	A non-statutory designated site of nature conservation interest.

Term	Definition
Wylfa Newydd Code of Construction Practice (Wylfa Newydd CoCP)	A document to set out and secure project-wide environmental requirements in accordance with the mitigation of construction activities relied on in the Environmental Statement, as well as construction commitments made through other assessment processes undertaken for the Wylfa Newydd Project (such as: • the Welsh Language Impact Assessment; • Health Impact Assessment; • HRA; • WFD Compliance Assessment, and • Equality Impact Assessment). The Wylfa Newydd CoCP and accompanying sub-CoCPs will be submitted and approved as part of the DCO application for the Wylfa Newydd DCO Project.
Wylfa Newydd Development Area	The indicative areas of land and sea including the Power Station Site and the surrounding areas that would be used for the construction and operation of the Wylfa Newydd Development Area Development.
Wylfa Newydd DCO Project	The elements of the Wylfa Newydd Project for which consent is being sought through the DCO comprising the construction and operation of the Power Station, other on-site development, the Marine Works, the Off-Site Power Station Facilities and the Associated Development.
Wylfa Newydd Project	The Wylfa Newydd Project (the Project) comprises the Wylfa Newydd DCO Project and the Enabling Works

2.3 Responsible parties

Table 2-2 Responsible parties

Responsible party	Description
Horizon Nuclear Power Wylfa Ltd (Horizon)	Horizon is a UK energy company developing a new generation of nuclear power stations to help meet the UK's need for stable and sustainable low carbon energy. Horizon's ultimate parent company is Hitachi Ltd., a Japanese corporation and the parent company of the multi-national Hitachi group of companies. Horizon is part of the Horizon Nuclear Power Limited group of companies which has premises in Gloucestershire and a site office on Anglesey.
Isle of Anglesey County Council (IACC)	The local authority governing the area within which the Wylfa Newydd Project is intended to be constructed.
Jacobs UK Ltd (Jacobs)	Consultants appointed by Horizon to undertake the EIA for the Wylfa Newydd Project.
Natural Resources Wales (NRW)	The public body whose stated purpose is to ensure that the natural resources of Wales are sustainably maintained, enhanced and used, now and in the future. It absorbed the regulatory and advisory duties of the Environment Agency Wales, Countryside Council for Wales and the Forestry Commission in Wales.

2.4 Scope

- 2.4.1 This report sets out the assessment of emissions of dust which could potentially occur from works associated with the construction of the Park and Ride. This assessment has been carried out in accordance with IAQM guidance [RD1] on the assessment of dust from demolition and construction. This report sets out the full construction dust assessment, including a description of the methodology, relevant input data, the assessment itself, recommended mitigation and monitoring measures and conclusions.

3 Assessment methodology

3.1 Introduction

- 3.1.1 Activities carried out on construction sites can give rise to emissions of dust which could cause annoyance to people or damage to vegetation due to the soiling of surfaces via the deposition of dust. These activities can also lead to increased short-term and long-term concentrations of fine particulate matter (e.g. PM₁₀ 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 the works associated with the Park and Ride therefore need to be addressed in order to identify the required mitigation measures.
- 3.1.2 The assessment of dust during construction has been carried out using a qualitative risk-based appraisal with reference to the location of the Park and Ride in relation to sensitive receptors, the planned process and site characteristics, as described in IAQM guidance [RD1].
- 3.1.3 IAQM guidance [RD1] aims to estimate the impacts of both PM₁₀ and dust together, through a combined risk-based assessment procedure. IAQM guidance [RD1] provides a methodological framework, but notes that professional judgement is required to assess impacts. This assessment does not consider the air quality impacts of exposure to contaminated dusts that could arise from the remediation of contaminated land. Although PM_{2.5} is not specifically included as a parameter within the assessment, the risk levels associated with PM₁₀ and any subsequent mitigation measures would also apply to PM_{2.5} as PM_{2.5} is included within the PM₁₀ fraction.

3.2 Potential sources

- 3.2.1 The temporary and varied nature of construction or other processes which include similar emission sources differentiates it from other fugitive dust sources when it comes to the estimation and control of emissions. The process 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 vary substantially over the different phases of the construction works. Emissions would also vary between the same types of activities. On large sites, the location of potentially dust-generating activities would also vary throughout the works.
- 3.2.2 There are potentially sensitive locations close to the boundary of the Park and Ride site including residential receptors and a Public Right of Way. Activities associated with the construction of the Park and Ride have the potential to produce emissions of dust that could be transported towards receptors by the wind. These are close enough to the Park and Ride site that without mitigation measures, they could perceive increases in the rate of dust deposition to property surfaces.
- 3.2.3 The activities associated with the construction of the Park and Ride are described in detail in chapter F1 (proposed development) (Application

Reference Number: 6.6.1) of the Environmental Statement. The key potential construction dust emission sources associated with these activities are summarised below. Where possible, these have been categorised according to the IAQM dust assessment method [RD1] for demolition, earthworks, construction and trackout. These are described below.

- Demolition activities: demolition of all existing buildings and associated infrastructure occupying an area of approximately 6,400m² within the Park and Ride site including the processing and storage of material associated with the demolitions and removal of vegetation, walls and other site clearance activities.
- Earthworks: activities include topsoil stripping and excavation to enable the site to be constructed with a suitable foundation course and surfacing. Further earthworks activities include excavation for the foundations of the bus transport facility, establishing a site compound, forming pedestrian routes and haul routes and installing drainage. Another potential source is wind picking up dust from material stockpiles and storage mounds which could occur if the wind speed is high enough and the stored material is dry, friable and mitigation measures were not in place.
- Construction activities: construction of the bus transport facility building/infrastructure and associated activities relating to the construction of the site compound.
- Vehicle movement and trackout: vehicles moving on and around the Park and Ride site emitting exhaust particulate matter and re-suspending loose material on the road. There would be the potential for spillage from transferring material around the Park and Ride site and particulates being lifted from open container vehicles by the wind generated from 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.

3.2.4 The construction dust assessment comprises a qualitative risk-based appraisal of the potential sources of dust and the impacts at the sensitive locations close to the Park and Ride site. Based on the calculated risk level, IAQM guidance [RD1] sets out clear requirements for the recommended mitigation measures which can be used to minimise the impact of dust during the construction phase of a development. The mitigation measures taken forward from this assessment are included as part of the approved air quality management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10).

3.2.5 Larger dust particles (greater than 30µm) make up the greatest proportion of dust emission from mineral workings or earthworks and will largely deposit within 100m of sources [RD3]. Intermediate sized particles (10µm–30µm) are likely to travel further distance. PM₁₀, 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 down-wind [RD4].

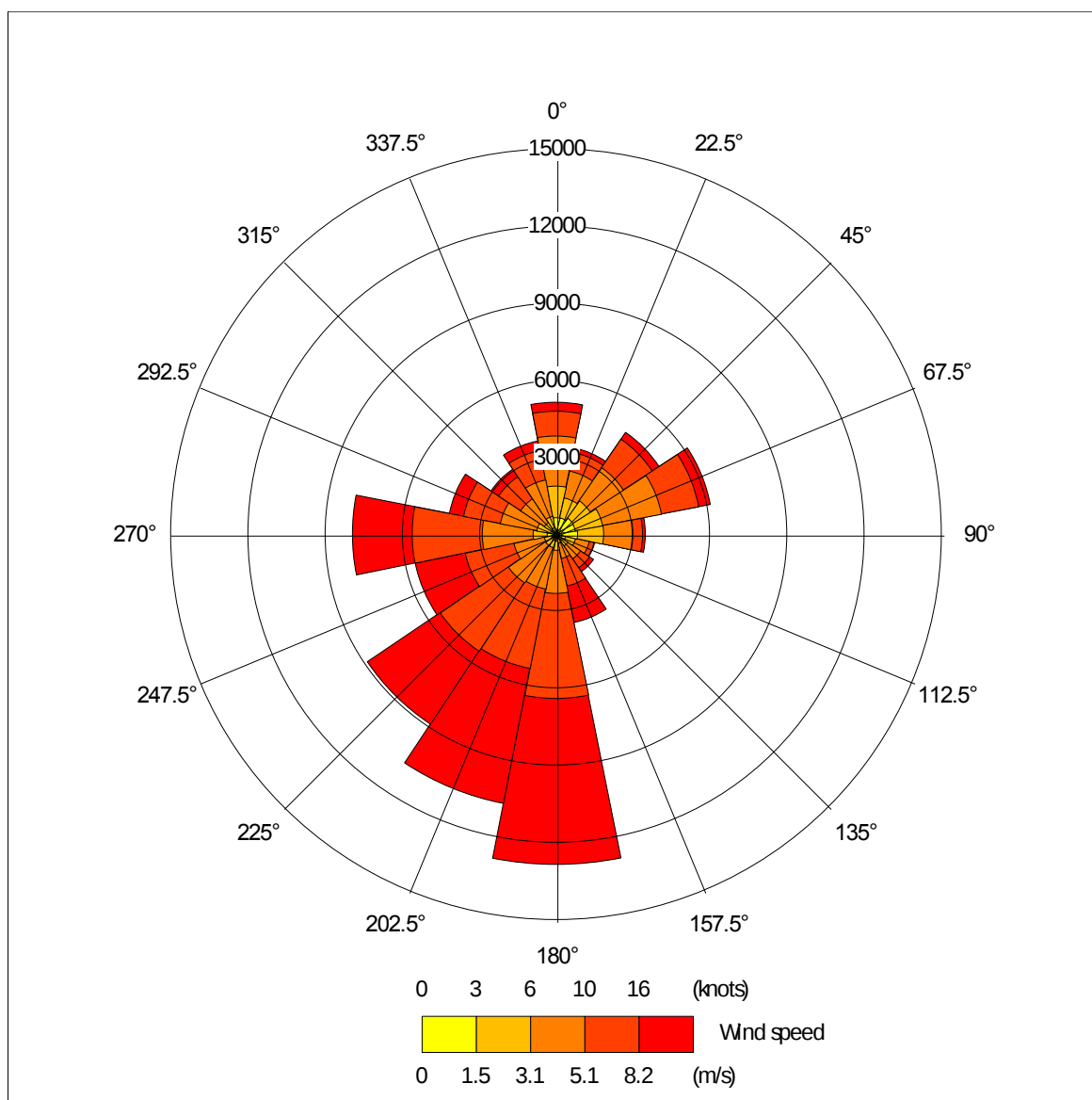
3.3 Baseline conditions

- 3.3.1 The assessment requires characterisation of the existing conditions with regard to PM₁₀ concentrations to determine the sensitivity of the area. A PM₁₀ concentration of 14.9µg/m³ has been used in this assessment to represent the background concentration. This concentration was recorded by the IACC during 2016 at a location adjacent to the Wylfa Newydd Development Area which is approximately 15km north of the Park and Ride site. In accordance with the IAQM methodology [RD1], the contribution from other local sources was also taken into account. In this case, the contribution to the background concentration from road traffic emissions on the A55 and other nearby roads including the A5 which was anticipated to occur during activities associated with construction of the Park and Ride, was included using dispersion modelling. This resulted in a maximum predicted total PM₁₀ concentration of 16.1µg/m³ at any of the relevant receptors to be considered as part of the construction dust assessment. Details of the dispersion modelling of road traffic emissions are provided in chapter C4 (air quality effects of traffic) (Application Reference Number: 6.3.4) of the Environmental Statement.
- 3.3.2 The IACC also undertook measurements of dust deposition rates at several locations in the vicinity of the Wylfa Newydd Development Area in 2012, 2013 [RD5] and 2016 [RD6]. The measured dust deposition rates ranged from 25.8 to 35.8 milligrams per square metre per day (mg/m²/day). These were reported by the IACC to be indicative of dust deposition rates for 'open country', and are well below the dust deposition rates that could possibly affect amenity. Suggested guidelines for the dust deposition rate for when complaints are likely are set out in *Suggested Guidelines for Deposited Ambient Dust* [RD7] and range from 140mg/m²/day for open countryside to 200mg/m²/day for residential areas and outskirts of towns (based on a large number of UK measurements [RD7]). The value for indicating when complaints are likely based on site-specific baseline measurement data in the vicinity of the Wylfa Newydd Development Area could be lower than the 140mg/m²/day value as the baseline measurements are generally lower than the UK-wide rural dataset. The measurements are also below the levels of dust deposition rates that could potentially affect sensitive vegetation [RD8].
- 3.3.3 The dust deposition measurements recorded in the vicinity of the Wylfa Newydd Development Area would be broadly representative of the dust deposition in most rural locations on Anglesey that are not close to specific sources of dust. The majority of sensitive locations in the vicinity of the Park and Ride are well over 200m from the A55 and would be considered as rural locations. As there are no other significant sources of dust emissions near to the Park and Ride, the dust deposition at nearby receptors would be expected to be similar to the rural measurements recorded in the vicinity of the Wylfa Newydd Development Area.

3.4 Local climatic conditions

- 3.4.1 Although not specifically required as part of the IAQM dust assessment method, analysis of the local climatic conditions was also undertaken to provide additional context to the risk assessment and assist in the determination of the sensitivity of the area.
- 3.4.2 Local climatic conditions such as wind speed and precipitation (rainfall) will affect the probability of airborne dust occurring from potentially dusty activities or open areas and stockpiles and can also affect the dispersion of dust in the air. The wind direction is a useful parameter to understand the likelihood of effects occurring at sensitive locations if dust is emitted or becomes airborne and how severe its effects could potentially be.
- 3.4.3 Meteorological data covering the period 1 January 2007 to 31 December 2016 were obtained from the RAF Valley weather station which is approximately 3km southwest of the Park and Ride and is considered representative of the climatic conditions experienced at the Park and Ride site. The wind data and associated precipitation rate data were examined to determine the frequency of occurrence of winds that blow towards receptor locations, strength of winds and frequency of rainfall in order to evaluate the likelihood of sensitive receptors located in the vicinity of the Park and Ride being potentially affected by fugitive dust emissions.
- 3.4.4 A wind rose for RAF Valley is provided in figure 3-1 for the period 1 January 2007 to 31 December 2016. The wind rose plot shows the direction the wind blows from, in five wind speed categories and the number of hours that it blows in each combination of speed and direction.

Figure 3-1 Wind rose – RAF Valley 2007–2016



3.4.5 Table 3-1 (below) tabulates the wind speed and direction data (based on hourly data) into 16 wind direction sectors, each of 22.5°, representing the commonly described wind directions (e.g. south (S) centred on 180°, south-southwest (SSW) centred on 202.5°, southwest (SW) centred on 225°, and so on). Table 3-2 (below) tabulates the wind speed and direction for dry periods (i.e. days with less than 1mm precipitation).

Table 3-1 RAF Valley data wind analysis (1 January 2007 to 31 December 2016)

Wind speed at height of 10m (m/s)	Wind direction sector																Total
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 – 0.5	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
0.5 – 5.0	4.2%	2.8%	3.3%	4.5%	3.4%	1.5%	1.3%	1.0%	2.3%	2.2%	2.2%	1.7%	2.9%	2.4%	1.7%	2.2%	39.5%
5.0 – 7.5	1.1%	0.8%	1.5%	1.6%	0.4%	0.2%	0.5%	0.9%	3.4%	2.7%	2.9%	1.8%	2.6%	1.5%	1.1%	1.3%	24.4%
7.5 – 10.0	0.4%	0.3%	0.6%	0.7%	0.2%	0.0%	0.2%	1.0%	3.8%	2.9%	2.5%	1.5%	2.0%	0.7%	0.5%	0.5%	17.7%
>10	0.2%	0.1%	0.1%	0.2%	0.0%	0.0%	0.1%	1.1%	5.2%	4.3%	2.5%	1.5%	1.6%	0.3%	0.2%	0.2%	17.6%
Total	6.1%	4.0%	5.5%	7.0%	4.0%	1.8%	2.0%	4.0%	14.7%	12.2%	10.1%	6.4%	9.1%	4.9%	3.5%	4.3%	99.6%

Note: 0.4% of the wind direction / speed data were not available.

Table 3-2 RAF Valley data wind analysis during dry days (daily rainfall less than 1mm) (01 January 2007 – 31 December 2016)

Wind speed at height of 10m (m/s)	Wind direction sector																Total
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 – 0.5	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
0.5 – 5.0	3.4%	2.3%	2.8%	3.6%	2.3%	1.0%	0.8%	0.7%	1.6%	1.6%	1.6%	1.1%	2.0%	1.6%	1.3%	1.7%	29.4%
5.0 – 7.5	0.7%	0.7%	1.2%	1.2%	0.2%	0.1%	0.1%	0.4%	2.1%	1.8%	1.8%	1.0%	1.6%	0.9%	0.8%	1.0%	15.6%
7.5 – 10.0	0.2%	0.2%	0.4%	0.5%	0.1%	0.0%	0.1%	0.3%	1.8%	1.6%	1.3%	0.7%	0.9%	0.3%	0.2%	0.2%	9.0%
>10	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.2%	1.5%	1.6%	0.8%	0.5%	0.7%	0.1%	0.1%	0.1%	6.0%
Total	4.5%	3.1%	4.5%	5.4%	2.7%	1.1%	1.1%	1.6%	7.1%	6.6%	5.5%	3.3%	5.1%	3.0%	2.3%	3.1%	60.2%

- 3.4.6 Table 3-1 presents the frequency of winds as a percentage of all winds at RAF Valley between 2007 and 2016 for each 22.5° wind direction sector within specified wind speed bands. Table 3-1 and figure 3-1 illustrate that the most frequent occurring wind direction is from a southerly direction occurring for 14.7% of the time, with winds from a south-southwesterly direction occurring frequently (12.2%). This indicates that nearby receptors to the north or north-northeast of any construction activity generating dust emissions would have the highest potential to experience increases in dust deposition or PM₁₀ concentrations.
- 3.4.7 The wind speed required to raise dust particles into the air from a surface, known as wind erosion, is dependent upon the size of the particle and other factors. In general, the higher the wind speed the greater the potential for the generation of airborne dust. It is generally accepted that wind erosion only becomes significant at wind speeds in excess of 5.0m/s at the surface based on a reference wind speed height at 10m. Table 3-1 shows that calm conditions (<0.5m/s) occur for approximately 0.3% of the time. Wind speeds between 0.5m/s and 5.0m/s occur for approximately 39.5% of the time, and wind speeds greater than 5.0m/s occur for 59.7% of the time.
- 3.4.8 However, the potential for dust to be emitted to air is higher during periods of extended dry weather. During periods of wet weather, dust emissions from surfaces would be decreased, as surfaces will be wet. Any coarse dust that becomes airborne would also be minimised through removal from the atmosphere through washout during periods of rainfall. When considering the lower potential for wind erosion to occur on days when it has been raining (assumed to be where the total rainfall in a day was 1mm or greater), table 3-2 shows that the percentage of time when the wind is above 5.0m/s and the conditions were dry is much lower, at 30.6% of the time.
- 3.4.9 Table 3-3 displays an analysis of precipitation rate data between 2007 and 2016 for the RAF Valley site and indicates that dry hours occur for over two-thirds of the total hours considered from the 10 years of meteorological data considered.

Table 3-3 RAF Valley precipitation data analysis (1 January 2007 to 31 December 2016)

Precipitation rate (mm/hour)	Frequency
0	86.9%
0.1 - 0.5	7.2%
0.5 - 1.0	2.1%
1.0 - 1.5	1.5%
1.5 - 2.0	0.6%
2.0 - 2.5	0.5%
2.5 - 3.0	0.2%
>3.0	0.5%

Note: 0.5% of the precipitation data were not available

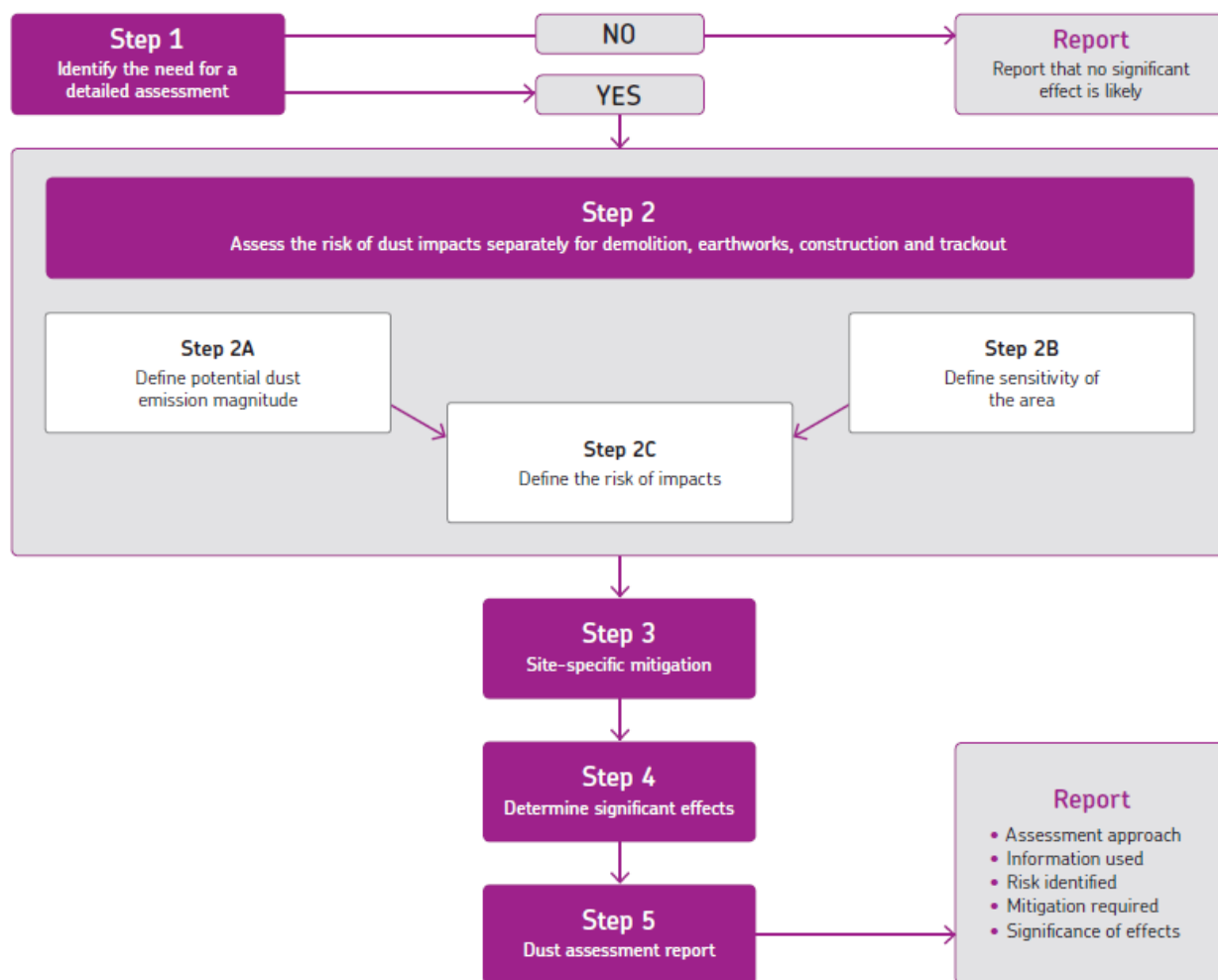
- 3.4.10 Considering the wind and rain analysis, the likelihood that the conditions which could lead to dust being emitted due to wind erosion when the wind speed is high enough (i.e. 5.0m/s or higher), and then transported in the air to nearby receptors is likely to be relatively low. For example, for the wind direction which occurs most frequently (i.e. south) the frequency of winds on dry days above 5.0m/s is only 5.4%, which equates to approximately 20 days in the year (see table 3-2).

3.5 IAQM assessment methodology

Outline of method

- 3.5.1 The methodology for the assessment of the construction impacts is based on a five-step approach as set out in figure 3-2.

Figure 3-2 Structure of construction dust assessment



Step 1 Identify the need for a detailed assessment

3.5.2 An assessment is required where there is:

- a human receptor within 350m of the boundary of the Park and Ride site and/or within 50m of the access route(s) used by construction vehicles on the public highway, up to 500m from the Park and Ride site entrance(s); and/or
- an ecological receptor within 50m of the boundary of the Park and Ride site and/or within 50m of the access route(s) used by construction vehicles on the public highway, up to 500m from the Park and Ride site entrance(s).

3.5.3 The requirement for a dust risk assessment can be screened out where the above criteria are not met, it can be concluded that the level of risk is Negligible and any effects 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 3-2.

Step 2 Assess the risk of dust impacts

Step 2A Define the potential dust emission magnitude

Demolition

- 3.5.4 The following are descriptors for the different dust emission magnitudes for demolition:

- Large:** total building volume greater than 50,000m³, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities greater than 20m above ground level;
- Medium:** total building volume 20,000m³ to 50,000m³, potentially dusty construction material, demolition activities 10m to 20m above ground level; and
- Small:** total building volume less than 20,000m³, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities less than 10m above ground, demolition during wetter months.

Earthworks

- 3.5.5 The following are descriptors for the different dust emission magnitudes for earthworks:

- Large:** total site area greater than 10,000m², potentially dusty soil type (e.g. clay, which would be prone to suspension when dry due to small particle size), more than 10 heavy earth-moving vehicles active at any one time, formation of bunds greater than 8m in height, total material moved greater than 100,000 tonnes;
- Medium:** total site area 2,500m² to 10,000m², moderately dusty soil type (e.g. silt), five to 10 heavy earth-moving vehicles active at any one time, formation of bunds 4m to 8m in height, total material moved 20,000 tonnes to 100,000 tonnes; and
- Small:** total site area less than 2,500m², soil type with large grain size (e.g. sand), fewer than five heavy earth-moving vehicles active at any one time, formation of bunds less than 4m in height, total material moved less than 20,000 tonnes, earthworks during wetter months.

Construction

- 3.5.6 The following are descriptors for the different dust emission magnitudes for construction:

- Large:** total building volume greater than 100,000m³, piling, on-site concrete batching, sandblasting;

Medium: total building volume 25,000m³ to 100,000m³, potentially dusty construction material (e.g. concrete), piling, on-site concrete batching; and

Small: total building volume less than 25,000m³, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

3.5.7 Trackout refers to the transport of dust and dirt from the Park and Ride site onto the public road network, where it may be deposited and re-suspended by other vehicles using the road network. Only receptors within 50m of the route(s) used by vehicles on the public highway up to 500m from the Park and Ride site entrance(s) are considered to be at risk.

3.5.8 The following are descriptors for the different dust emission magnitudes for trackout:

Large: greater than 50 HDV outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length greater than 100m;

Medium: 10 to 50 HDV outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m to 100m; and

Small: fewer than 10 HDV outward movements in any one day, surface material with low potential for dust release, unpaved road length less than 50m.

Step 2B Define the sensitivity of the area

3.5.9 The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- the local background PM₁₀ concentrations; and
- site-specific factors.

3.5.10 For the assessment of the sensitivities of people to dust soiling effects and to the health effects of PM₁₀, the receptors have been identified as 'High', 'Medium' or 'Low' sensitivity based on Box 6 in the IAQM guidance [RD1] as reproduced below.

Sensitivities of people to dust soiling effects

High:

- users can reasonably expect the enjoyment of a high level of amenity; or
- the appearance, aesthetics or value of their property would be diminished by soiling, and the people or property would reasonably be

expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.

Medium:

- users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
- the appearance, aesthetics or value of their property would be diminished by soiling; or
- the people or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.

Indicative examples include parks and places of work.

Low:

- the enjoyment of amenity would not reasonably be expected;
- property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or
- there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods as part of the normal pattern of use of the land.

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

Sensitivities of people to the health effects of PM₁₀

High:

- locations where members of the public are exposed over a period relevant to the Air Quality Objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).

Indicative examples include residential properties. Hospitals, schools and residential care homes (if present) should also be considered as having equal sensitivity to residential areas for the purpose of this assessment.

Medium:

- locations where the people exposed are workers, and exposure is over a period relevant to the Air Quality Objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).

Indicative examples may include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.

Low:

- locations where human exposure is transient.

Indicative examples include public footpaths, playing fields, parks and shopping streets.

Sensitivities of receptors to ecological effects

3.5.11 For the assessment of the sensitivity of the area with regard to impacts on ecological receptors, the relevant ecological receptors have been identified as High, Medium or Low sensitivity as advised in IAQM guidance [RD1], as described below.

High:

- locations with an international or national designation and where the designated features may be affected by dust soiling; or
- locations where there is a community of a particularly dust-sensitive species such as vascular species included in the Red Data List for Great Britain [RD9].

Indicative examples include a Special Area of Conservation designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.

Medium:

- locations where there is a particularly important plant species, where dust sensitivity is uncertain or unknown; or
- locations with a national designation where the features may be affected by dust deposition.

An indicative example is a Site of Special Scientific Interest with dust sensitive features.

Low:

- locations with a local designation where the features may be affected by dust deposition.

An indicative example is a Wildlife Site with dust sensitive features.

3.5.12 Table 3-4 and table 3-5 set out the selection criteria for the sensitivity of the area to dust soiling effects on people and property, and the selection criteria for the sensitivity of the area to human health impacts, respectively.

3.5.13 Table 3-6 sets out the selection criteria for the sensitivity of the area with regard to impacts on ecological receptors.

Table 3-4 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 3-5 Criteria for the sensitivity of the area to human health

Receptor sensitivity	Annual mean PM ₁₀ concentration	Number of receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	> 32µg/m ³	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	28 – 32µg/m ³	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	24 – 28µg/m ³	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	< 24µg/m ³	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Medium	> 32µg/m ³	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	28 – 32µg/m ³	>10	Medium	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	24 – 28µg/m ³	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	< 24µg/m ³	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Low	n/a	>1	Low	Low	Low	Low	Low

Table 3-6 Criteria for the sensitivity of the area to ecological impacts

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

Step 2C Define the risk of impacts

- 3.5.14 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 3-7 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 3-7 Determination of risk of dust impacts

Sensitivity	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
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Low risk	Negligible risk
Low	Low risk	Low risk	Negligible risk

Step 3 Site-specific mitigation

- 3.5.15 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 a risk category for the demolition, earthworks, construction and trackout activities based on table 3-7, appropriate mitigation measures can be identified. Activities identified as High risk would require a greater level of mitigation than those identified as Low risk.

- 3.5.16 A selection of these measures has been specified for Low risk to High risk sites in the IAQM guidance [RD1] as measures suitable to mitigate dust emissions from activities such as those which would be undertaken during the construction of the Park and Ride.

Step 4 Determine significant effects

- 3.5.17 Following Step 2 (definition of the Park and Ride, 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 are considered to be sufficient based on the successful application of these measures at other construction sites to reduce emissions of dust, such that a significant effect would not occur at off-site receptors.

- 3.5.18 The approach in Step 4 of IAQM dust assessment guidance [RD1] 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.”

- 3.5.19 IAQM guidance 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 effects will be not significant.”

- 3.5.20 Step 4 of IAQM guidance [RD1] recognises that the key to the above approach is that it assumes that the regulators, such as the IACC and NRW, ensure that the proposed mitigation measures are implemented. The management plan should include the necessary systems and procedures to facilitate regular 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 Step 1 Identify the need for a detailed assessment

- 4.1.1 An assessment of demolition and construction impacts was undertaken in accordance with IAQM methodology as described earlier and as set out in section 3. 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 Park and Ride site.
- 4.1.2 There are human receptors within 350m of the boundary of the Park and Ride site and therefore, further assessment is required. A count of the relevant human receptors within the specified assessment bands was carried out as recommended in the IAQM guidance [RD1], the results of which are set out in table 4-1. The receptors have been identified as being of High, Medium or Low sensitivity as per the criteria set out in paragraph 3.5.10. A figure of the relevant receptors within the assessment bands for dust soiling from the boundary of the Park and Ride site is provided in figure 9-1 (see section 9 of this report).
- 4.1.3 As per IAQM guidance [RD1], the High sensitivity receptors presented in table 4-1 for demolition, earthworks and construction include the approximate number of residents and staff expected to occupy the Gwyddfor Residential Home (up to 25 residents and staff) which is located approximately 210m northeast of the Park and Ride northern site boundary.
- 4.1.4 The nearest section of the Cartio Môn Go-Karting centre go-kart track is approximately 50m to the east of the eastern site boundary. This has been included in the receptor count as a Medium sensitivity receptor as per the criteria set out in 3.5.10.
- 4.1.5 There is one Public Right of Way approximately 300m north of the Park and Ride site and the National Cycle Network Route 8 which is approximately 270m south of the site. These have been included in the receptor count as having Low sensitivity as per the criteria set out in 3.5.10 and have been presented in figure 9-1(see section 9 of this report).
- 4.1.6 The assessment has demonstrated that there are no human receptors (e.g. residential properties or commercial premises) within 50m of the local road network used by vehicles leaving the site up to 500m from the construction site entrance. The trackout route is displayed in figure 9-1(see section 9 of this report).

Table 4-1 Dust soiling and human health receptor count

Receptor count				
Demolition, earthworks and construction		Receptor sensitivity		
		High	Medium	Low
Distance from the Park and Ride site boundary	<20m	0	0	0
	<50m	0	1	0
	<100m	0	1	0
	<350m	38	4	3
Trackout		High	Medium	Low
Distance from roads up to 500m from the Park and Ride site exit	<20m	0	0	0
	20m–50m	0	0	0

- 4.1.7 The effects of construction dust on ecological sites have also been considered. The absence of any relevant ecological sites within 50m of the boundary of the Park and Ride site or ecological sites within 50m of the route(s) used by construction vehicles up to 500m from the site entrance(s), meant the potential effects of construction dust on ecological sites was not required to be considered further. The nearest ecological receptors are Llyn Traffwll Site of Special Scientific Interest which is located approximately 830m south of the Park and Ride site and Llyn Dinam Special Area of Conservation which is located approximately 1.4km southwest of the site.

5 Step 2 Assess the risk of dust impacts

5.1 Step 2A Define the potential dust emission magnitude

- 5.1.1 The works associated with the Park and Ride would be split into several stages, which would involve different periods of demolition, earthworks, construction and trackout, and activity levels would not necessarily peak simultaneously.
- 5.1.2 The dust emission magnitudes of each activity have been specified with reference to the definitions of dust emission magnitudes in section 3.5 and using professional judgement in line with IAQM guidance [RD1]. These are summarised below.

Demolition: Demolition activities include the demolition of all existing buildings and associated infrastructure including the processing and storage of material associated with the demolition and removal of vegetation, walls and other site clearance activities. However, the existing farm buildings within the Park and Ride site have mostly been demolished with only a steel portal frame barn-type structure and a ground floor slab of an existing house remaining. Furthermore, the existing stone wall along the southern boundary of the site would be retained during construction of the Park and Ride. Therefore, as minimal demolition activities are anticipated during construction of the Park and Ride, the proposed demolition activities have been classified as a dust emission class of 'Small'.

Earthworks: Excavation activities include topsoil stripping and excavation to enable the site to be constructed with a suitable foundation course and surfacing. This would include earthworks for all roads, car park areas, bus drop-off areas and pedestrian footways. Further earthworks activities include excavation for the foundations of the bus transport facility. Other earthworks are also required for establishing a site compound, pedestrian routes, haul routes and installing drainage. The total amount of material to be excavated or moved is likely to be in excess of 300,000 tonnes, which includes construction material (e.g. sub-base and road/car park surfacing). There are likely to be 5-10 heavy earth-moving vehicles active at any one time. The formation of topsoil mounds would be at a maximum height of 2m. The soil profile comprises a heavy clay loam which may be prone to suspension when dry due to small particle size. The site area is in excess of 100,000m². Based on the amount of material to be moved or handled, the proposed earthworks have been classified as a dust emission class of 'Large'.

- Construction:** The construction required for the Park and Ride include a bus transport facility building, cycle store, smoking shelter and gas meter housing. The construction stage would utilise potentially dusty construction materials such as concrete. However, it should be noted the car parking areas (totalling approximately 32,000m² providing parking for up to 1,900 vehicles) would utilise a permeable paving type which would minimise the amount of potentially dusty construction works on-site. The total building volume is approximately 2,500m³ and on-site batching and sandblasting activities are not anticipated. On this basis, the assessment for construction is based on a dust emission class of 'Small'.
- Trackout:** During the construction phase, the maximum number of daily outward movements of HDVs is anticipated to be approximately 26. On this basis, the assessment for trackout is based on a dust emission class of 'Medium'.

- 5.1.3 Table 5-1 presents the dust emission magnitude for each activity based on the criteria set out in section 3.5.

Table 5-1 Dust emission magnitude

Activity	Dust emission magnitude
Demolition	Small
Earthworks	Large
Construction	Small
Trackout	Medium

5.2 Step 2B Define the sensitivity of the area

- 5.2.1 The Park and Ride site is surrounded to the west, north and east by undeveloped agricultural land with the A5 and the northern part of Junction 4 of the A55 adjacent to the southern boundary. There are isolated residential properties to the north and east of the Park and Ride boundary, including the Gwyddfor Residential Home and Cartio Môn Go-Karting centre. If the activities associated with the construction of the Park and Ride were to produce excessive dust emissions, it is possible that significant impacts may be experienced at these properties if suitable mitigation measures are not employed. The hourly sequential meteorological data as described in section 3.4 show that the most frequent wind direction is from the south. This means that, on average, receptors to the north of the Park and Ride site would be most susceptible to any potential fugitive dust emissions from the activities described in section 5.1.
- 5.2.2 Table 5-2 displays the sensitivities of the surrounding area to demolition, earthworks, construction and trackout based on the criteria set out in table 3-4 and table 3-5, numbers of receptors within certain distance bands from the boundary of the Park and Ride site (see table 4-1) and existing PM₁₀ concentrations. The IAQM guidance [RD1] recommends that the receptor

distance is based on the distance from the source rather than the site boundary. This assessment was undertaken on the basis that all activities (i.e. demolition, earthworks, construction and trackout) take place at the construction boundary of the Park and Ride site. 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 5-2 Sensitivity of the area

Potential impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Low	Low	Low	N/A
Human health	Low	Low	Low	N/A

- 5.2.3 Table 5-2 shows that, based on the number of receptors within proximity of the Park and Ride site and the background PM₁₀ concentration, the sensitivity of the area with regard to dust soiling or human health is categorised as Low for all stages of the development, except trackout. The sensitivity of human receptors to trackout activities is categorised as “N/A”; these have not been considered further in the assessment due to the absence of receptors within the study area.

5.3 Step 2C Define the risk of impacts

- 5.3.1 Using the dust emission magnitudes for the various activities in table 5-1 and the sensitivity of the area provided in table 5-2, the levels of risk for each activity are provided in table 5-3 for dust soiling and human health impacts.

Table 5-3 Summary of the dust risks for human receptors

Potential impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Negligible risk	Low risk	Negligible risk	Negligible risk
Human health	Negligible risk	Low risk	Negligible risk	Negligible risk

- 5.3.2 The results in table 5-3 indicate that for potential dust soiling impacts and human health impacts, there is predicted to be a Low risk from earthworks and a Negligible risk from demolition, construction and trackout activities.

5.4 Summary

- 5.4.1 Although the results in table 5-3 indicate that there would be a Low risk from earthworks and a Negligible risk from demolition, construction and trackout activities, it will still 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. These good practice mitigation measures will also prevent or reduce potential dust or PM₁₀ (and PM_{2.5}) emissions associated with health effects such as exacerbating existing conditions including asthma and other lung conditions.
- 5.4.2 The proposed mitigation measures are set out in section 6.

6 Step 3 Park and Ride site-specific mitigation

6.1 Recommended mitigation measures

- 6.1.1 The results in section 5 indicate that the works associated with the construction of the Park and Ride are a Low risk for dust soiling and human health impacts. Good practice mitigation measures would be needed to reduce the potential for dust emissions to potentially lead to significant dust effects in the vicinity of the Park and Ride site. The suggested good practice mitigation measures which should be adopted for the construction of the Park and Ride are set out below.
- 6.1.2 The mitigation measures have been derived from those specified in the IAQM guidance [RD1] and where possible at this stage, adapted to the activities associated with the Park and Ride works. 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 6-1 to table 6-6 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. Some of the mitigation measures listed within the IAQM guidance for trackout (mitigation numbers 44, 46, 47 and 48) were considered to represent general on-site activities and operation of haul roads and were moved to the 'Operations' section (see table 6-2) of the general mitigation measures required for all sites. The general good practice mitigation measures were specified based on the highest risk category (i.e. based on the Low risk to human receptors from dust soiling) as recommended by the IAQM guidance [RD1]. For specific mitigation relating to demolition, construction and trackout, the Low risk category was used to determine the mitigation as a conservative approach.
- 6.1.3 As specified above, the measures to control dust emissions taken forward from this assessment, derived from the highly recommended and desirable measures (see table 6-1 to table 6-6), and the monitoring of the effectiveness of the mitigation, would be included in the air quality management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10). These would be delivered during construction.
- 6.1.4 When applying the mitigation measures, IAQM guidance [RD1] 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.”
- 6.1.5 The mitigation measures set out in table 6-1 to table 6-6 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. However, these would be included within the proposed mitigation measures.

Table 6-1 Mitigation for the Park and Ride: 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 Park and Ride site.	Not required
2. Display the name and contact details of person(s) accountable for air quality and dust issues on the Park and Ride site boundary. This may be the environment manager/engineer or the site manager.	Highly recommended
3. Display the head or regional office contact information.	Highly recommended <i>Display the Horizon Enquiries number</i>

Table 6-2 Mitigation for the Park and Ride: dust management

Mitigation measure	Highly recommended/ Desirable/not required
4. Develop dust mitigation and control measures as part of the air quality management strategies as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10) and implement these on-site through an appropriate management plan which is derived from the approved Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10). 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. The desirable measures should be included as appropriate for the Park and Ride site.	Desirable
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

Mitigation measure	Highly recommended/ Desirable/not required
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 log book.	Highly recommended
8. Hold regular liaison meetings with other high-risk construction sites within 500m of the Park and Ride site boundary, 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
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 100m of the Park and Ride site boundary, with cleaning to be provided if necessary.	Desirable
10. Carry out regular site inspections to monitor compliance with the management plan, 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 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 on-site or, if at a large site, before work on a phase commences. Further guidance is provided by IAQM [RD10] on monitoring during demolition, earthworks and construction.	Not required <i>Although not required, dust deposition monitoring is proposed (see section 6.2)</i>
Preparing and maintaining the site	
13. Plan site layout so that machinery and dust-causing activities are located as far away from receptors as is possible.	Highly recommended

Mitigation measure	Highly recommended/ Desirable/not required
14. Erect solid screens or barriers around dusty activities, or the Park and Ride 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 Park and Ride site is active for an extensive period.	Desirable
16. Avoid site runoff of water or mud.	Highly recommended
17. Keep Park and Ride site fencing, barriers and scaffolding clean using wet methods.	Desirable
18. Remove materials that have a potential to produce dust from the Park and Ride site as soon as possible, unless being re-used on-site. If they are being re-used on-site, cover as described below.	Desirable
19. Cover, seed or fence stockpiles to prevent wind whipping.	Desirable
Operating vehicles/machinery and sustainable travel	
21. Ensure all vehicles switch off engines when stationary - no idling vehicles.	Highly recommended
22. Avoid the use of diesel/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.	Not required <i>However, the measures to manage/mitigate the effects of constructing the Park and Ride will be covered within the traffic and transport management strategy within the wider Wylfa Newydd CoCP (Application Reference Number: 8.6)</i>
25. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car sharing).	

Mitigation measure	Highly recommended/ Desirable/not required
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 Park and Ride site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	Highly recommended
28. Use enclosed chutes and conveyors 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.	Desirable
44. Avoid dry sweeping of large areas.	Desirable
46. Inspect on-site haul routes for integrity and instigate any necessary repairs to the surface as soon as reasonably practicable.	Not required
47. Record all inspections of haul routes and any subsequent action in a site log book.	Not required
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers, and regularly cleaned.	Not required
Waste management	
31. Avoid bonfires and burning of waste materials.	Highly recommended

Table 6-3 Mitigation 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 required <i>Only a steel portal frame barn-type structure and a ground floor slab of an existing house remains.</i>
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.	Highly recommended
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly recommended
35. Bag and remove any biological debris or damp down such material before demolition.	Highly recommended

Table 6-4 Mitigation 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.	Not required
37. Use hessian fabric, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	Not required
38. Only remove the cover in small areas during work and not all at once.	Not required

Table 6-5 Mitigation 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.	Desirable
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.	Not required
42. For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.	Not required <i>Recommended as best practice</i>

Table 6-6 Mitigation 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.	Desirable
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Desirable
49. Implement a wheel-washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Desirable
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.	Not required
51. Access gates to be located at least 10m from receptors where possible.	Not required <i>This would be achieved as there are no receptors within 10m of the proposed entrance.</i>

6.2 Air quality monitoring

- 6.2.1 Although the works have been categorised as a Low risk, an appropriate monitoring survey, as proposed in table 6-2, 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 monitoring near demolition and construction sites [RD10] and would include dust deposition monitoring using passive dust deposition gauges. Supplementary monitoring of weather conditions including wind speed, wind direction and rainfall would be undertaken.
- 6.2.2 The IAQM monitoring guidance [RD10] states that:
- “Monitoring may be carried out in order to fulfil a number of objectives:*
- To ensure that the construction activities do not give rise to any exceedances of the air quality objectives/limit values for PM₁₀ and/or PM_{2.5}, or any exceedances of recognised threshold criteria for dust deposition/soiling;*
 - To 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.”*

6.2.3 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).

6.2.4 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 strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10).

7 Step 4 Determine significant effects

- 7.1.1 The assessment has identified that there are potentially sensitive dust receptors located near to the northern and eastern boundary of the Park and Ride site (see figure 9-1). There are 38 high sensitivity receptors located within 350m of the Park and Ride site (see table 4-1). The receptor locations are reported from the 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 PM₁₀ and PM_{2.5}) would be offset from the 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 5-2 as being Low sensitivity with respect to emissions of PM₁₀ and PM_{2.5} and Medium sensitivity with respect to changes in dust deposition rates and associated effects on amenity.
- 7.1.2 Consideration of the meteorological conditions experienced within the study area (section 3.4) has identified that there is the potential for dust generated on-site to be blown towards receptors on all sides of the Park and Ride site, with receptors located to the north or north-northeast being downwind more frequently. The scale of the works has been used to judge the dust emission magnitude, as being a Large dust emission magnitude for earthworks, Medium dust emission magnitude for trackout and Small magnitudes for demolition and construction activities (table 5-1).
- 7.1.3 Based on the matrix of relationships between the sensitivity of the area and the dust emission magnitudes, it is considered that the proposed earthworks activities are predicted to be a Low risk (see table 5-3) as there is limited potential for emissions of PM₁₀ and PM_{2.5} to increase baseline concentrations to a value that is above the air quality objective values set for the protection of human health. For potential dust soiling effects, there is predicted to be a Low risk from earthworks (see table 5-3), principally due to the lack of high sensitivity receptors within 100m of the site. It is unlikely that dust deposition rates could be increased by an amount that residents and other receptors could perceive, however, there could still be the potential for infrequent, short-term episodes when baseline dust deposition rates could be increased. There is a negligible risk from demolition, construction and trackout activities to cause significant dust soiling effects.
- 7.1.4 The adoption of good practice dust mitigation measures to manage the generation of emissions at source will therefore be required, as proposed in the air quality management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10).
- 7.1.5 There are mitigation methods already available that have been successfully applied on other schemes to manage emissions of dust so that significant off-site effects 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 Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application

Reference Number: 8.10). It is considered that there are no potentially dust generating activities proposed that could not be managed using normal good practices [RD1] so as to prevent significant effects at any off-site receptor.

- 7.1.6 This should be considered in conjunction with the analysis of local climatic conditions (see section 3.4) which shows that the likelihood of dust being emitted by wind erosion and being transported to off-site receptor locations is relatively low.
- 7.1.7 IAQM guidance [RD1] notes that with the application of good practice mitigation measures of the type available for use on this project, the environmental effect will not be significant at any off-site receptor. IAQM guidance [RD1] 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 air quality management strategies set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10), occasional impacts may occur. The Wylfa Newydd CoCP (Application Reference Number: 8.6) and Park and Ride sub-CoCP (Application Reference Number: 8.10) provides a framework by which the level of mitigation is adapted to respond proactively to the changing risk of dust emissions, so that significant effects are prevented.

8 References

Table 8-1 Schedule of references

ID	Reference
RD1	Institute of Air Quality Management (IAQM). 2016. <i>Guidance on the Assessment of Dust from Demolition and Construction Version 1.1</i> . London: Institute of Air Quality Management.
RD2	British Standards Institution. 1994. <i>BS 6069-2 Characterisation of Air Quality. Glossary</i> , 94th Edition, 15 August 15, 1994. London: British Standards Institution.
RD3	The Scottish Office. 1998. Planning Advice Note PAN 50 Annex B, Controlling the Environmental Effects of Surface Mineral Workings, Annex B: The Control of Dust at Surface Mineral Workings. Edinburgh: The Scottish Office Development Department.
RD4	Arup. 1995. <i>The Environmental Effects of Dust from Surface Mineral Workings</i> . PECD 7/1/468. Report on behalf of the Department of the Environment. London: HMSO
RD5	Isle of Anglesey County Council (IACC). 2014. <i>Air Quality Progress Report for Isle of Anglesey County Council</i> . Isle of Anglesey County Council, Llangefni.
RD6	Isle of Anglesey County Council. 2017. Air quality monitoring data provided in an email from the IACC on 08 March 2017.
RD7	Vallack, H. W. Shillito, D. E. 1998. Suggested guidelines for deposited ambient dust. <i>Atmospheric Environment</i> , Vol. 32, No. 16, 08.1998, pp. 2737-2744.
RD8	Environment Agency. 2003. Assessment of noise disturbance upon birds and dust on vegetation and invertebrate species. Report Ref. 6502-E.075EA.
RD9	Cheffings, C.M. and Farrell, L. (Eds.), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. 2005. The Vascular Plant Red Data List for Great Britain. Species Status 7: 1-116. Peterborough: Joint Nature Conservation Committee.
RD10	Institute of Air Quality Management. 2012. <i>Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites</i> . London: Institute of Air Quality Management.

9 Figures

Figure 9-1 Construction dust assessment: study areas and human and ecological receptors

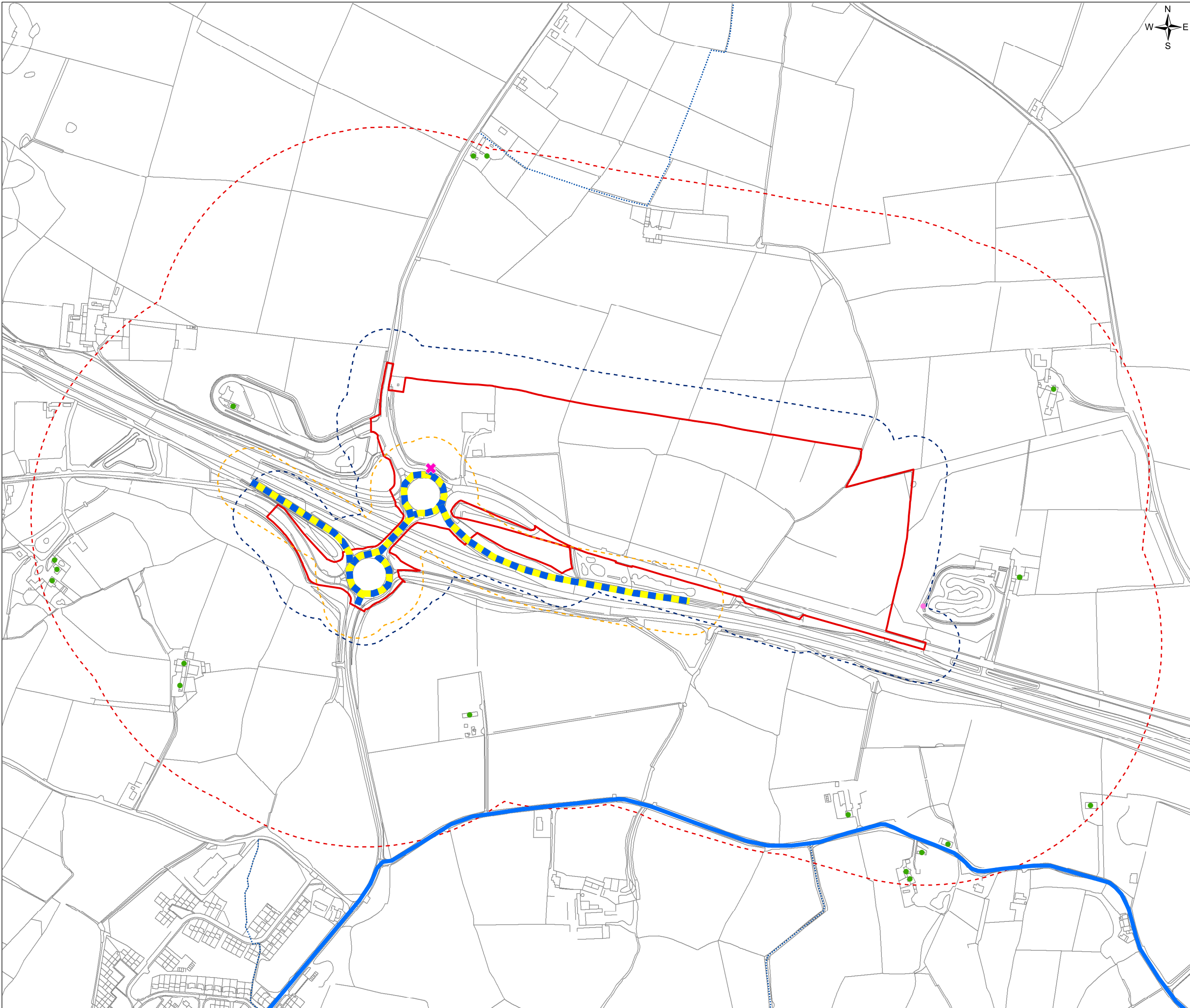


FIGURE 9-1

- Legend**
- Park and Ride order limit
 - Construction dust assessment study area for ecological receptors (50m from the Park and Ride)
 - Construction dust assessment study area (50m from the route(s) used by construction vehicles up to 500m from the site entrance)
 - Construction dust assessment study area for human receptors (350m from the Park and Ride)
 - Public Rights of Way
 - National Cycle Network Route 8
 - Access routes up to 500m from the site entrance
 - ✕ Site entrance
 - Park and Ride human receptor location**
 - 20-50m
 - 100-350m



1.0	MAR 18	DCO submission	HNPWL	HNPWL	HNPWL	HNPWL
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Client			HORIZON NUCLEAR POWER			
Project			WYLFA NEWYDD PROJECT ENVIRONMENTAL STATEMENT			
Drawing Title			CONSTRUCTION DUST ASSESSMENT STUDY AREAS AND HUMAN AND ECOLOGICAL RECEPTORS			
Scale @ A3	1:5,500		DO NOT SCALE			
Jacobs No.	60PO8077					
Client No.						
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