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Welsh Government

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A487 New Pont-ar-Ddyfi

Environmental Statement –
Volume 1: Chapter 6 Air Quality

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6 Air Quality

6.1 Introduction

- 6.1.1** This chapter details the potential effects of the Scheme on local air quality during both construction and operational phases.
- 6.1.2** There is the potential for local air quality to be affected during the construction of the Scheme by exhaust emissions from vehicles and fugitive dust emissions from site activities.
- 6.1.3** Emissions from vehicle exhausts contain a number of pollutants, including oxides of nitrogen (NO_x), carbon monoxide (CO), hydrocarbons, carbon dioxide (CO₂) and particulate matter (PM). The quantities of each pollutant emitted depend on the type of vehicle, quantity and type of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed into the ambient air. Local air quality would be affected as a result of the Scheme redistributing vehicles across the network.

6.2 Legislation, Policy Context and Guidance

Legislation

- 6.2.1** In Wales, objectives for specified air quality pollutants are set in national legislation. Additionally, limit values (pollutant concentrations not to be exceeded by a certain date) are set by the European Union and are used to determine the UK's compliance with EU legislation. Both national air quality objectives and EU limit values, which provide the same pollutant concentration as a standard to be met, have been used within this assessment to inform the significance of effect.

EU Limit Values

- 6.2.2** In May 2008, the Council Directive (2008/50/EC) on Ambient Air Quality and Cleaner Air for Europe (European Commission, 2008) came into force. The Directive sets 'limit values' and 'target values' for ambient concentrations of pollutants for both the protection of human health and designated sites. The limit values defined in the Directive are legal requirements and compliance with these is reported on an annual basis by the Department for Environment, Food and Rural Affairs (Defra). The Directive requires the UK to be divided into zones for the purposes of air quality management and assessment.
- 6.2.3** The Scheme is located in the North Wales Zone (UK0042), which is covered by an Air Quality Plan (Defra, 2015) for the

achievement of EU limit value for NO₂. The Air Quality Plan states that exceedences of the NO₂ EU limit value were recorded in the zone in 2013 but that the zone is predicted to be compliant by 2020. Exceedences within the zone are not recorded within the study area of the Scheme. Consideration has been given to the EU limit values to determine the air quality effects of the Scheme in the North Wales Zone.

- 6.2.4** The EU Directive was transposed into national legislation in Wales by the Air Quality Standards (Wales) Regulations 2010 (National Assembly for Wales, 2010).

Welsh Objectives

- 6.2.5** The current Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in 2007 (Defra *et al.*, 2007). This set the strategy for meeting the air quality objectives. The Local Air Quality Management (LAQM) system, required to be undertaken by local planning authorities under the Environment Act 1995, assesses where the UK objectives may be exceeded. Where exceedences are recorded an Air Quality Management Area (AQMA) must be declared by the local authority and an Air Quality Action Plan (AQAP) prepared to implement measures to improve air quality in these areas. The impact of the Scheme upon air quality concentrations in relation to the air quality objectives has been used to inform the overall significance of effect of the Scheme as set out in IAN 174/13 (Highways Agency, 2013).

Air Quality Objectives and Limit Values

- 6.2.6** The air quality EU limit values and Welsh air quality objectives applicable to the Scheme are shown in Table 6.1. Some pollutants have standards expressed as annual mean (long-term) concentrations due to the chronic way in which they affect health or the natural environment (i.e. effects occur after a prolonged period of exposure to elevated concentrations). Others have standards expressed as 24-hour, 1-hour or 15-minute (short-term) mean concentrations due to the acute way in which they affect health or the natural environment (i.e. after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long-term and short-term concentrations.

Table 6.1: Air Quality Standards

Pollutant	Averaging Period	EU Limit Value / Welsh Objective	Date for Compliance
Human Health			
Nitrogen Dioxide (NO ₂)	Annual mean	40µg/m ³	Wales(a) 11 June 2010 EU(b) 01 Jan 2010
	1-hour mean	200µg/m ³ not to be exceeded more than 18 times a year (99.8th percentile)	Wales(a) 11 June 2010 EU(b) 01 Jan 2010
Fine Particulate Matter (PM ₁₀)	Annual mean	40µg/m ³	Wales(a) 11 June 2010 EU(b) 01 Jan 2005
	24-hour mean	50µg/m ³ not to be exceeded more than 35 times a year (90. 4th percentile)	Wales(a) 11 June 2010 EU(b) 01 Jan 2005
(a) The Air Quality Standards (Wales) Regulations 2010, No. 1433 (b) Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe			

6.2.7 In addition to limit values to protect human health, the EU has set NO_x limit values for the protection of vegetation. The annual mean limit value for NO_x for the protection of vegetation is 30 µg/m³. No locations where the limit value for NO_x would apply have been identified within the study area of the assessment, therefore compliance with the EU limit value for NO_x has not been considered further within this chapter.

Policy Context

National Planning Policy

6.2.8 The land-use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent upon the details of the proposed development.

Planning Policy Wales, Edition 9, November 2016

6.2.9 Planning Policy Wales (Welsh Government, 2016) sets out land-use planning policies for Wales. One of the underlying aims is

the protection of the environment, which includes air quality policies. Specific policies relating to air quality are provided by Planning Policy Wales as:

- Policy 13.10 - Improving the Quality of Water and Air;
- Policy 13.11 - Development Plans and Improving the Quality of Water and Air; and
- Policy 13.12 - Development Management and Improving the Quality of Water and Air.

6.2.10 Air quality specific policies of Planning Policy Wales 13.10 and 13.12 include the following excerpts:

6.2.11 ‘The planning system should determine whether a development is an acceptable use of land and should control other development in proximity to potential sources of pollution rather than seeking to control the processes or substances used in any particular development.’

6.2.12 ‘The potential for pollution affecting the use of land will be a material consideration in deciding whether to grant planning permission. Material considerations in determining applications for potentially polluting development are likely to include:

- Location, taking into account such considerations as the reasons for selecting the chosen site itself;
- Impact on health and amenity;
- The risk and impact of potential pollution from the development ... particularly if the development would impact on an Air Quality Management Area (AQMA), an area which has been declared as exceeding the UK air quality objectives, or a Special Area of Conservation (SAC); and
- Prevention of nuisance.’

6.2.13 Chapter 8 of Planning Policy Wales includes policies specifically related to transport, including the highway network, and it is noted that emissions from transport contribute significantly to climate change and air pollution, which can in turn affect human health. Planning Policy Wales promotes the need to integrate the strategies and policies for both transport and air quality.

6.2.14 In addition to the above, the Wales Transport Strategy (Welsh Government, 2008) aims to reduce the contribution of transport to air pollution and other harmful emissions. The strategy states that transport development which could increase air pollution levels in air quality management areas or lead to new areas being created will not normally be supported.

6.2.15 National planning policy has been considered when undertaking the assessment.

Local Planning Policy

- 6.2.16** The study area of the air quality assessment, as discussed later in this chapter, covers a number of local authority areas. Planning Policy relating to air quality for each of the local authorities covered by the study area is outlined below.

Powys County Council Unitary Development Plan 2001-2016

- 6.2.17** The Powys County Council (PCC) Unitary Development Plan (UDP) (Powys County Council, 2010), adopted in 2010 sets out relevant local planning policy. A Local Development Plan (LDP) is currently being prepared and is likely to be adopted in December 2016 and will replace the UDP. It is not anticipated that any additional policies relating to air quality will be included in the LDP.

- 6.2.18** Policy T1 is primarily directed at highway design within the County, however as an element of this policy the Council acknowledges the limitations of highway building in alleviating air pollution issues. It reflects Government policy to provide means to reduce congestion and, as a result, opportunities for air pollution to be reduced and air quality improved.

Snowdonia National Park Authority Local Development Plan 2007-2022

- 6.2.19** The Eryri Local Development Plan (LDP) (Snowdonia National Park Authority, 2011) adopted by Snowdonia National Park Authority (SNPA) in 2011, provides a framework for development within the National Park area during the plan period, which runs until mid-2022. Protection of the local environment, including local air quality is highlighted within the LDP. There are overarching policies that require the conservation and enhancement of the National Park's natural resources, including air quality, but there are no policies related specifically to air quality. Protection of the local environment is highlighted in 'Development Policy 6: Sustainable Design and Materials', which states:

'The development will not have an unacceptable adverse impact, through increased resource use, discharges or emissions, on public health, surface and ground water (quality, quantity or ecology), air quality, soil and the best and most versatile agricultural land.'

- 6.2.20** The LDP also ensures a development does not cause significant harm to the environment, residential amenity and amenity of the Park via dust or odour.

6.2.21 The Management Plan (Snowdonia National Park Authority, 2010) for SNPA considers air pollution in urban areas as an indicator of possible threats to one of the Park's special qualities, in this case the diversity of high quality landscapes and coastal areas.

Relevant Guidance

6.2.22 DMRB Volume 11, Section 3, Part 1: HA207/07 Air Quality (Highways Agency. et al, 2007) provides limited guidance regarding the assessment of air quality during construction. Therefore, industry standard guidance (IAQM, 2014) published by the Institute of Air Quality Management (IAQM) has been used to provide a more robust technical assessment. This approach is considered to represent contemporary best practice.

6.2.23 The method for assessing the likely operational air quality effects of the Scheme has followed the simple level assessment methodology outlined in DMRB HA 207/07. In addition, the associated Interim Advice Notes (IANs) have been considered:

- IAN 170/12v3 Updated Air Quality Advice on the Assessment of Future NO_x and NO₂ Projections for Users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (Highways Agency, 2012); and
- IAN 174/13 Updated Advice for Evaluating Significant Local Air Quality Effects for DMRB Volume 11, Section 3, Part 1 'Air Quality' (Highways Agency, 2013).

6.2.24 The IANs listed above have not yet been adopted in Wales, however, it is considered that these IANs reflect current best practice guidance and, as there is no suitable Welsh equivalent guidance, these have been used to inform the proposed method of assessment. It has been acknowledged that references to the National Planning Policy Framework (NPPF) set out in the above IANs are not relevant in the Welsh context and that national planning policy is as set out in Planning Policy Wales, discussed above.

6.2.25 Highways England have produced IAN 175/13 to assess compliance with Limit Values contained in the EU Directive. IAN 175/13 has been withdrawn and is currently pending update. Therefore, no assessment has been undertaken following the IAN 175/13 assessment methodology. Notwithstanding this, predicted pollutant concentrations in the study area are shown to be well below the national air quality objectives and EU limit values.

6.2.26 IAN 185/15 (Highways Agency, 2015) 'updated traffic, air quality and noise advice on the assessment of link speeds and generation of traffic data into speed-bands' provides an

assessment methodology for assessing the impact of congestion on local air quality. The study area does not suffer from congestion therefore an assessment using IAN 185/15 has been scoped out.

Dust Guidance

- 6.2.27** Dust is the generic term used in the British Standard document BS 6069 (Part Two) to describe particulate matter in the size range 1–75 µm in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions of the Environmental Protection Act 1990 (HMSO, 1990), dust nuisance is defined as a statutory nuisance.
- 6.2.28** There are currently no formal standards or guidelines for what constitutes dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local planning authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).
- 6.2.29** The IAQM has published guidance on the assessment of dust from demolition and construction (IAQM, 2014). This provides a risk-based qualitative approach for determining the potential for dust impacts during the construction phase of the Scheme and has been adopted as contemporary best practice for the Scheme.

6.3 Study Area

- 6.3.1** The study area of the air quality assessment is defined by the guidance used to assess potential air quality effects. Air quality effects during the construction phase have been assessed within 350m of the site boundary within which all associated works will occur, and is shown in Figure 6.1, Volume 2.
- 6.3.2** For the local air quality assessment, the Affected Road Network (ARN) is defined in the DMRB HA207/07 as those roads within the study area of the traffic model that meet any of the criteria set out below. The criteria are change-based, where change is based on the difference in traffic data or highway design between the do-minimum (without Scheme) and do-something (with

Scheme) scenarios for both the opening and future assessment year (opening year +15 years).

- Road alignment will change by 5 metres or more;
- Daily traffic flows (two way) will change by 1,000 Annual Average Daily Traffic (AADT) or more;
- Heavy Duty Vehicle (HDV) flows (two way) will change by 200 AADT or more;
- Daily average speed (two way) will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

6.3.3 A review of traffic data provided by the transport planners for the Scheme indicated that the ARN would include Pont-ar-Ddyfi, the A487 between Pont-ar-Ddyfi and the Scheme, and the Scheme itself. The Scheme triggers the road realignment criteria set out in DMRB HA207/07 due to the change in route of the A487 as a result of the Scheme and redistribution of traffic from the Pont-ar-Ddyfi to the Scheme. The study area for the local air quality assessment is shown in Figure 6.1, Volume 2.

6.3.4 The local assessment encompasses a 200 metre corridor (Highways Agency *et al.*, 2007) either side of the roads included in the ARN. Receptors, such as residential properties have been considered within this corridor. No internationally or nationally designated ecological sites have been identified within the study area of the local air quality assessment.

6.3.5 The criteria used to define the study area for the assessment of regional air quality effects are also set out in the DMRB. However, these differ from those set out for the local air quality assessment. The criteria for determining the regional road network considered are presented below:

- A change of more than 10% in AADT; or
- A change of more than 10% to the number of heavy duty vehicle; or
- A change in daily average speed of more than 20 km/hr.

6.3.6 The Scheme would result in a redistribution of traffic from the existing Pont-ar-Ddyfi to the proposed viaduct as part of the Scheme but would not result in a change to overall traffic movements or average speeds on the road network. Therefore, an assessment of regional air quality has been scoped out of the assessment as none of the criteria above have been met and the effect of the Scheme would be negligible.

6.4 Methodology

6.4.1 The following two assessments have been undertaken to determine the likely significant air quality effects arising as a result of the Scheme:

- A construction phase dust assessment; and
- A local air quality assessment for the existing Pont-ar-Ddyfi, the proposed new Scheme and any other roads which are included in the ARN.

6.4.2 The following potential air quality effects have been scoped out of the air quality assessment.

6.4.3 The operation of site equipment, vehicles and machinery during the construction of the Scheme would result in emissions to atmosphere of exhaust gases, but such emissions are not considered to be significant, particularly in comparison to levels of emissions of the same pollutants from vehicle movements on the local road network. Site equipment and machinery emissions will be intermittent and in most cases further away from sensitive receptors than the local road network, which will continue to be the main source of pollutants during the construction phase of the Scheme. As such, the impacts of site equipment have been scoped out of this assessment.

6.4.4 The emissions from Heavy Goods Vehicles (HGVs) associated with the construction of the Scheme have been scoped out of the assessment due to the temporary nature of the works and the minimal impact the additional vehicles would have on overall pollutant concentrations. It is envisaged that the Scheme could generate up to approximately 10 total workforce trips (to and from site) per day, and approximately 15 total construction vehicle trips (to and from site) per day. Additional vehicles during construction do not trigger the DMRB HA207/07 criteria for HGV traffic of more than 200 additional HGV movements per day.

6.4.5 There are no ecological sites within 200m of the Scheme therefore air quality effects on ecological receptors have been scoped out in line with DMRB HA207/07. Beyond 200m from the road pollutant concentrations from vehicle exhausts would be very small and therefore air quality effects as a result of the Scheme at designated sites more than 200m from the road would be negligible.

6.4.6 As discussed above, no assessment has been undertaken following the IAN 175/13 or IAN185/15 methodology published by Highways England.

Identification of Baseline

- 6.4.7** Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, and natural sources.
- 6.4.8** A desk-based review of the following data sources has been undertaken to determine baseline conditions of air quality in this assessment:
- GC and PCC review and assessment reports and local air quality monitoring data;
 - The UK-Air Information Resource website¹; and
 - The Environment Agency (EA) / Natural Resources Wales (NRW) website².

Methodology for Construction Impacts

- 6.4.9** Fugitive dust emissions arising from construction and demolition activities are likely to be variable in nature and would depend upon the type and extent of activity, soil type and moisture, road surface conditions and weather conditions.
- 6.4.10** Construction, demolition and earthwork activities as a result of the Scheme may all have an impact on local air quality. Trackout of material onto local roads where it can be re-suspended may also affect air quality. Trackout refers to the transport of dust and PM₁₀ from construction areas onto the road network.

Construction Phase

- 6.4.11** Since the publication of DMRB HA207/07, further guidance has been released by the IAQM regarding local air quality effects during construction. Effects arising from the construction phase of the Scheme have therefore been assessed using the qualitative approach described in the IAQM Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014), which provides a more robust technical assessment than the DMRB HA207/07 method. This approach is considered to represent contemporary best practice for assessment of the construction phase.
- 6.4.12** The IAQM guidance considers the potential for dust emissions from the following activities:

¹ <http://iaqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

² <http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=e>

- Earthworks i.e. soil stripping, ground levelling, excavation and land capping;
- Trackout i.e. incidental movement of dust and dirt from the construction or demolition site onto the public road network;
- Demolition; and
- Construction.

6.4.13 For each of these activities, the guidance considers three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in PM₁₀ exposure.

6.4.14 The methodology takes into account the scale to which the above effects are likely to be generated (classed as small, medium or large). Also, the distance of the closest receptors and background PM₁₀ concentrations are taken into account in order to determine the sensitivity of the surrounding area. This is then taken into consideration to derive an overall site risk and identify suitable mitigation measures. The receptors can be both human and ecological and are chosen based on their sensitivity to dust soiling and PM₁₀ exposure.

6.4.15 The four assessment steps are summarised in Volume 3 Appendix 6.1 with further descriptions of each step in the following sections.

Step 1: Screen need for assessment

6.4.16 The first step is the initial screening for the need for an assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 350m of the site boundary and/or within 50m of the route(s) used by the construction vehicles on the public highway and up to 500m from site entrance(s). There are no ecological receptors sensitive to dust within the defined study area for the construction phase therefore the construction dust assessment has focussed on human health receptors only.

Step 2: Assess the risk of dust impacts

6.4.17 This step is divided into three sections, 2A, 2B and 2C, details of which are provided below.

Step 2A – Identifies the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large.

6.4.18 For this step, a description of the site and its surroundings has been collated to inform the overall significance and professional judgement. Each of the construction activities has been given a dust emission magnitude, based on the criteria shown in Table 6.2.

Table 6.2: Categorisation of Dust Emission Magnitude

Dust Emission Magnitude		
Small	Medium	Large
Demolition		
<ul style="list-style-type: none"> • total building volume <20,000m³ • construction material with low potential for dust release (e.g. metal cladding or timber) • demolition activities <10m above ground • demolition during wetter months 	<ul style="list-style-type: none"> • total building volume 20,000 - 50,000m³ • potentially dusty construction material • demolition activities 10 - 20m above ground level 	<ul style="list-style-type: none"> • total building volume >50,000m³ • potentially dusty construction material (e.g. concrete) • on-site crushing and screening • demolition activities >20m above ground level
Earthworks		
<ul style="list-style-type: none"> • total site area <2,500m², soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • formation of bunds <4m in height • total material moved <20,000 tonnes • earthworks during wetter months 	<ul style="list-style-type: none"> • total site area 2,500m² - 10,000m², moderately dusty soil type (e.g. silt) • 5-10 heavy earth moving vehicles active at any one time • formation of bunds 4m - 8m in height • total material moved 20,000 - 100,000 tonnes 	<ul style="list-style-type: none"> • total site area >10,000m² potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • formation of bunds >8m in height • total material moved >100,000 tonnes
Construction		
<ul style="list-style-type: none"> • total building volume <25,000 m³ • construction material with low potential for dust release (e.g. metal cladding or timber) 	<ul style="list-style-type: none"> • total building volume 25,000m³ - 100,000m³ • potentially dusty construction material (e.g. concrete) • piling • on-site concrete batching 	<ul style="list-style-type: none"> • total building volume >100,000m³ • piling • on-site concrete batching • sandblasting
Trackout		
<ul style="list-style-type: none"> • <10 HDV (>3.5t) trips in any one day 	<ul style="list-style-type: none"> • 10-50 HDV (>3.5t) trips in any one day 	<ul style="list-style-type: none"> • >50 HDV (>3.5t) trips in any one day

Dust Emission Magnitude		
Small	Medium	Large
<ul style="list-style-type: none"> • surface material with low potential for dust release • unpaved road length <50m 	<ul style="list-style-type: none"> • moderately dusty surface material (e.g. high clay content) • unpaved road length 50m – 100m; 	<ul style="list-style-type: none"> • potentially dusty surface material (e.g. high clay content) • unpaved road length >100m

Step 2B – defines the sensitivity of the area to dust impacts which is defined as low, medium or high sensitivity. This step takes into account a number of factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM₁₀ the local background concentrations; and
- Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

6.4.19 The sensitivity of an area is based on the guidance and professional judgement. The general principles to assess sensitivity are provided in Table 6.3.

Table 6.3: Examples of Factors Defining Sensitivity of an Area

Sensitivity of Surrounding Area	Examples	
	Sensitivity of People to Dust Soiling Effects	Sensitivities of People to the Health Effects of PM ₁₀
Low	Enjoyment of amenity would not reasonably be expected; There is property that would not reasonably be expected to be diminished in appearance, aesthetics or values by soiling; There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land; Indicative examples include playing fields, farmland (unless commercially sensitive	Locations where human exposure is transient; Indicative examples public footpaths, playing fields, parks and shopping streets.

Sensitivity of Surrounding Area	Examples	
	Sensitivity of People to Dust Soiling Effects	Sensitivities of People to the Health Effects of PM10
	horticulture), footpaths, short term car parks and roads.	
Medium	Users would expect to enjoy a reasonably level of amenity, but would not reasonably expect to enjoy the same levels of amenity as in their home; The appearance, aesthetics or value of their property could be diminished by soiling; Indicative examples include parks and places of work.	Locations where people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM10 (in the case of the 24-hour objectives a relevant locations would be one where individuals may be exposed for eight hours or more in a day); Indicative examples may include offices and shops, but will generally not include workers occupationally exposed to PM10 as potential is covered by Health and Safety at Work legislation.
High	Users can reasonably expect a enjoyment of a high level of amenity the appearance, aesthetics or values 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, museum and other culturally important collections, medium and long term car parks and car showrooms.	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM10 (in the case of the 24-hour objectives a relevant locations would be one where individuals may be exposed for eight hours or more in a day); Indicative examples include residential properties. Hospitals and schools and residential care homes should also be considered as having equal sensitivity to residential areas.

6.4.20 Once the specific receptors have been identified the sensitivity of these receptors is determined based on the sensitivity of the area to dust soiling effects on people and property and on the sensitivity of the area to human health. The tables used in assessing these sensitivities are shown in Table 6.4 and Table 6.5.

Table 6.4: 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 6.5: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM10 concentration	Number of receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<300
High	>32 µg/m ³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m ³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m ³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Step 2C – takes the results from step 2A and 2B and combines these to define the risk of impacts.

6.4.21 The guidance provides the matrices with which the risk of dust impacts can be defined from the results of both the dust magnitude and sensitivity of the area. The matrices for assessment are provided in Table 6.6.

Table 6.6: Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
Earthworks			
High	High	High	High
Medium	Medium	Medium	Medium
Low	Low	Low	Low
Construction			
High	High Risk Site	Medium Risk Site	Low Risk Site
Medium	Medium Risk Site	Medium Risk Site	Low Risk Site
Low	Low Risk Site	Low Risk Site	Negligible
Trackout			
High	High Risk Site	Medium Risk Site	Low Risk Site
Medium	Medium Risk Site	Low Risk Site	Negligible
Low	Low Risk Site	Low Risk Site	Negligible

Step 3: Determine site specific mitigation (if required)

- 6.4.22** Following assignment of a risk rating to each of the activities, appropriate mitigation measures should be identified. Where the risk is assessed as negligible, no mitigation measures beyond best practice are necessary and no significant effects would be anticipated.

Step 4: Define risks of effects and their significance

- 6.4.23** For all construction activity the aim should be to prevent significant impacts on receptors through the use of effective mitigation. IAQM guidance indicates that once mitigation measures are applied, in most cases the dust effects will be reduced to negligible levels.

Step 5: Prepare a dust assessment report

- 6.4.24** The last step of the assessment is the preparation of a Dust Assessment Report which is covered in Section 6.6 of this report.

Methodology for Operational Impacts

- 6.4.25** The assessment of local air quality effects associated with the operation of the Scheme has been undertaken following the simple level DMRB HA207/07 assessment methodology using the DMRB spreadsheet method (Highways Agency, 2007a). The simple level assessment is appropriate as existing air quality within the study area is well below relevant air quality objectives and the Scheme does not generate additional traffic but redistributes vehicles from the Pont-ar-Ddyfi to the Scheme.
- 6.4.26** The change in pollutant concentrations has been assessed at receptors within 200m of the affected road network. These changes were determined using the 'local' section of the DMRB screening method. The DMRB screening method determines pollutant concentrations at receptors as a function of traffic flows and distance to nearby roads.
- 6.4.27** The assessment focuses primarily on NO₂ and PM₁₀ as these are the pollutants of concern for human health in relation to road vehicle emissions.

Assessment Scenarios

- 6.4.28** The following scenarios have been used in the assessment:
- 2015 baseline scenario;
 - 2015 projected baseline scenario³;
 - 2019 Do-Minimum (DM) scenario: the traffic scenario at the year of opening without the Scheme;
 - 2019 Do-Something (DS) scenario; the traffic scenario at the year of opening with the Scheme;
 - 2034 Do-Minimum (DM) scenario: the traffic scenario at the future year without the Scheme; and
 - 2034 Do-Something (DS) scenario: the traffic scenario at the future year with the Scheme.
- 6.4.29** Background pollutant concentrations and vehicle emissions are predicted to improve with time, in most cases this improvement will outweigh air quality impacts of potential future traffic growth, and therefore the worst case with regards to air quality would be the opening year (2019) of the Scheme.

³ The projected base year is produced as part of the future year NO_x and NO₂ sensitivity testing carried out for IAN 170/12v3 (Highways Agency, 2013c). It has the base year traffic modelled using the opening and future year vehicle emission factors and opening and future year background concentrations.

Traffic Data

- 6.4.30** The DMRB screening method requires 24hr Annual Average Daily Traffic (AADT) flows, the percentage of Heavy Duty Vehicles (HDVs) and the average speed (kph) for all assessment scenarios discussed above. Traffic data and distances from receptor to road used in the assessment are shown in Volume 3, Appendix 6.2.
- 6.4.31** The DMRB (v1.03c) spreadsheet method includes in-built emission factors for all years up to 2025, which are used to calculate roadside pollutant concentrations. Background pollutant concentrations are then added to the outputs using background pollutant mapping published by Defra to provide total pollutant concentrations at assessed receptors. For the future year (2034), emissions factors have been held constant at 2025 rates. This is considered to be worst case as emissions would be anticipated to improve further with time due to advances in vehicle emission technology.
- 6.4.32** Since publication of the DMRB screening method, uncertainties have arisen regarding future predictions of emission rates for nitrogen oxides (Defra 2011). Highways England has produced IAN 170/12v3 to provide a sensitivity test for the opening year which takes into account the uncertainty associated with future emission rates and background pollutant concentrations. The IAN 170/12v3 methodology provides more pessimistic results for the opening year of the Scheme, compared to the DMRB spreadsheet method, as it assumes future emission controls within the UK vehicle fleet are not as successful as expected.
- 6.4.33** Since the assessment was undertaken, traffic calming measures have been included in the Scheme design on the A493 past Pen-y-Bont cottages to reduce speed and increase safety. The addition of these traffic calming measures would have a minor effect on the assessment of air quality and would not change the conclusion of the assessment shown in this chapter.

Receptors

- 6.4.34** The study area of the air quality assessment comprises 200m each side of the road from those routes affected by the Scheme. Receptors have been identified within this area including residential properties where the greatest change in air quality is anticipated as a result of the Scheme. The selected receptors are shown in Table 6.7 and Figure 6.3, Volume 2.

Table 6.7: Assessed Receptors for Local Air Quality

Receptor ID	Address	X	Y	Defra X	Defra Y
OP1	Ysgoldy	274428	301965	274500	301500
OP2	5 Dyfi Cottages	274408	301959	274500	301500
OP3	4 Dyfi Cottages	274402	301957	274500	301500
OP4	2 Dyfi Cottages	274391	301955	274500	301500
OP5	1 Dyfi Cottages	274385	301954	274500	301500
OP6	3 Dyfi Cottages	274396	301956	274500	301500
OP7	Planning Pending	274453	301408	274500	301500
OP8	7 Dyfi Cottages	274444	301956	274500	301500
OP9	Pennant	274555	302007	274500	302500
OP10	8 Dyfi Cottages	274450	301958	274500	301500
OP11	Bryn Y Coed, Pont-ar-Ddyfi	274546	302007	274500	302500
OP12	6 Dyfi Cottages	274414	301960	274500	301500
OP13	Ysgoldy	274434	301972	274500	301500
OP14	Y Fridd Farm	274956	302239	274500	302500
OP15	Newlyn, Station Road	274443	301291	274500	301500

NO_x to NO₂ conversion

6.4.34.1 The DMRB screening method predicts NO_x concentrations and these need to be converted to NO₂ for comparison with air quality standards. In line with the latest Local Air Quality Management Technical Guidance (Defra, 2009) (LAQM TG(09)) the NO_x to NO₂ conversion spreadsheet (v4.1) (Defra,2014) available from the Defra website has been used to calculate total and road NO₂ concentrations from modelled road NO_x concentrations.

Background Pollutant Concentrations

6.4.35 Background pollutant concentrations are added to the modelled road contribution of NO₂ and PM₁₀. Mapped background concentration data (Defra, 2015a) available from the Defra website for each 1 km x 1 km grid square of the UK, have been used to determine the background pollutant concentrations at each of the assessed receptors. The corresponding grid square

locations are shown in Table 6.7. Annual mean background NO₂ and PM₁₀ concentrations used at each of the assessed receptors are shown in

6.4.36 Table 6.8 and Table 6.9.

Table 6.8: Annual Mean NO₂ Background Concentrations at Assessed Receptors

Receptor ID	Address	2015 Background dNO ₂ (µg/m ³)	2019 Background d NO ₂ (µg/m ³)	2034 Background NO ₂ (µg/m ³)
OP1	Ysgoldy	5.67	4.87	4.35
OP2	5 Dyfi Cottages	5.67	4.87	4.35
OP3	4 Dyfi Cottages	5.67	4.87	4.35
OP4	2 Dyfi Cottages	5.67	4.87	4.35
OP5	1 Dyfi Cottages	5.67	4.87	4.35
OP6	3 Dyfi Cottages	5.67	4.87	4.35
OP7	Planning Pending	5.67	4.87	4.35
OP8	7 Dyfi Cottages	5.67	4.87	4.35
OP9	Pennant	5.13	4.38	3.89
OP10	8 Dyfi Cottages	5.67	4.87	4.35
OP11	Bryn Y Coed, Pont-ar-Ddyfi	5.13	4.38	3.89
OP12	6 Dyfi Cottages	5.67	4.87	4.35
OP13	Ysgoldy	5.67	4.87	4.35
OP14	Y Fridd Farm	5.13	4.38	3.89
OP15	Newlyn, Station Road	5.67	4.87	4.35

Table 6.9: Annual Mean PM₁₀ Background Concentrations at Assessed Receptors

Receptor ID	Address	2015 Background d PM10 (µg/m ³)	2019 Background d PM10 (µg/m ³)	2034 Background PM10 (µg/m ³)
OP1	Ysgoldy	10.67	10.35	10.07
OP2	5 Dyfi Cottages	10.67	10.35	10.07

Receptor ID	Address	2015 Background PM10 ($\mu\text{g}/\text{m}^3$)	2019 Background PM10 ($\mu\text{g}/\text{m}^3$)	2034 Background PM10 ($\mu\text{g}/\text{m}^3$)
OP3	4 Dyfi Cottages	10.67	10.35	10.07
OP4	2 Dyfi Cottages	10.67	10.35	10.07
OP5	1 Dyfi Cottages	10.67	10.35	10.07
OP6	3 Dyfi Cottages	10.67	10.35	10.07
OP7	Planning Pending	10.67	10.35	10.07
OP8	7 Dyfi Cottages	10.67	10.35	10.07
OP9	Pennant	10.47	10.16	9.89
OP10	8 Dyfi Cottages	10.67	10.35	10.07
OP11	Bryn Y Coed, Pont-ar-Ddyfi	10.47	10.16	9.89
OP12	6 Dyfi Cottages	10.67	10.35	10.07
OP13	Ysgoldy	10.67	10.35	10.07
OP14	Y Fridd Farm	10.47	10.16	9.89
OP15	Newlyn, Station Road	10.67	10.35	10.07

Model Verification

6.4.37 No air quality monitoring is undertaken near to the Scheme, therefore verification of the DMRB spreadsheet method has not been possible. The lack of air quality monitoring data with which to undertake model verification is not considered a limitation of the air quality assessment as existing low levels of pollutant concentrations in the study area are dominated by agricultural sources rather than traffic sources. Even if model verification was possible and was undertaken, this would not change the conclusions of the air quality assessment where a potential exceedence of the relevant air quality objectives would be required for significant air quality effects to be recorded.

Significance Criteria

6.4.38 The significance of local air quality effects as a result of dust impacts arising during construction has been assessed using professional judgement having regard to the IAQM guidance. The guidance states that with appropriate mitigation, where

required, no significant effects would be anticipated during construction.

6.4.39 Evaluation of the significance for the local air quality assessment of the operational phase has been undertaken in accordance with IAN 174/13 (Highways Agency, 2013). This requires evaluation of significance for NO₂ and PM₁₀ concentrations. The estimated levels of pollution in the opening year of assessment, and the change due to the Scheme, have been compared with the air quality objectives.

6.4.40 Section 2 of IAN 174/13 (Highways Agency 2013) describes the approach to formally describe a quantified change in NO₂ or PM₁₀ concentrations at a particular receptor between the Do Minimum and Do Something scenarios. Table 6.10 presents the definition for the magnitude of change for NO₂ and PM₁₀ concentrations, this has been considered for each of the assessed receptors. Terminology has been adjusted for consistency with other topics in this EIA.

Table 6.10: Descriptors for Magnitude of NO₂ and PM₁₀ Impacts on Human Health

Magnitude of Impact	Change in Annual Mean NO ₂ and PM ₁₀ Concentrations
Major (large)	>4 µg/m ³
Moderate (medium)	>2 to 4 µg/m ³
Minor (small)	>0.4 to 2 µg/m ³
Negligible (imperceptible)	<0.4 µg/m ³

6.4.41 Section 3 of IAN 174/13 (Highways Agency, 2013) describes the approach to determine overall significant local air quality effects. The guidance in Section 3 and Table 3.1 of IAN 174/13 (Highways Agency, 2013) has been taken into account within the assessment (see Table 6.11).

Table 6.11: Overall Evaluation of Local Air Quality Significance

Key Criteria Questions	Yes/No
Is there a risk that environmental standards will be breached?	
Will there be a large change in environmental conditions?	
Will the effect continue for a long time?	
Will many people be affected?	
Is there a risk that designated sites, areas, or features will be affected?	
Will it be difficult to avoid, or reduce or repair or compensate for the effect?	
On balance is the overall effect significant?	
Evidence in support of the professional judgement:	

Consultation

- 6.4.42** Consultation on the proposed methodology was carried out as part of the formal EIA Scoping conducted for the Scheme. Feedback from Local Authorities was sought. No specific comments were made with regards to air quality and therefore the approach to the assessment remained as set out in the Scoping Report and discussed in detail above.

Limitations and Assumptions

- 6.4.43** There are a number of limitations and uncertainties associated with air quality modelling predictions. The DMRB spreadsheet method is a simple assessment method that does not use local meteorological data or detailed terrain data to predict pollutant concentrations. Predictions for the opening and future assessment years are based on best available information and forecasts available at the time of writing.
- 6.4.44** The traffic model is carried out using methodology prescribed in WebTAG Unit M3.1 and is considered to be the most accurate method available for the purposes of air quality assessment. Any variation in traffic due to uncertainty in the model would not cause a significant change in predicted air quality.
- 6.4.45** As discussed above, there is uncertainty regarding predictions of future emission factors used within the air quality assessment. Sensitivity testing of opening and future year predictions has been undertaken using the IAN170/12v3 assessment methodology, the results of which are reported and have been used as part of this assessment to determine the significance of effect.
- 6.4.46** The air quality assessment has been undertaken using national standards appropriate for EIA assessment and therefore the limitations do not affect the robustness of the air quality assessment for EIA purposes.

6.5 Baseline Environment

- 6.5.1** This section describes the baseline air quality conditions in the surrounding area of the Scheme. Baseline ambient air quality refers to the concentrations of relevant substances that are already present in the atmosphere – these are present from various sources, such as industrial processes, commercial and domestic activities, agricultures, traffic and natural sources.

Industrial Processes

- 6.5.2** Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission

limits to be met and ensuring that any releases are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes. Part A processes are regulated through the Pollution Prevention and Control (PPC) system (EC Directive 96/91/EC on Pollution Prevention and Control originally implemented into law via the Pollution Prevention and Control Act (1999)) which was superseded in 2007 by the Environmental Permitting Regulations (HMSO, 2007) which were subsequently amended in 2010 (HMSO, 2010). Generally, the larger, more polluting processes are regulated by Natural Resources Wales (NRW) and smaller, less polluting ones by the local authorities.

- 6.5.3** In Powys County, there is one industrial air polluting process recorded by NRW located within 2km of the Scheme. Mountstar Metal Corporation Limited operate an aluminium granule plant 1.72km south east of the Scheme. Emissions to air from this process affects ambient air quality in the area. However, the contribution is included in background pollutant concentrations used in this assessment (See Table 6.8 and Table 6.9).

Review and Assessment

- 6.5.4** All local planning authorities are required by the Environment Act 1995 Part IV to carry out a review and assessment of air quality. This involves examining current pollutant concentrations, estimating future concentrations and comparing the future concentrations with the objectives in the National Air Quality Strategy.
- 6.5.5** Where the objectives are not likely to be achieved in all relevant locations, the local planning authority must designate these areas as AQMA.
- 6.5.6** The Scheme has the potential to affect air quality within the following local authority areas:
- Powys County Council;
 - Gwynedd Council; and
 - Snowdonia National Park Authority.

Powys County Council Air Quality Progress Report 2013

- 6.5.7** The most recent Air Quality Progress Report (Powys County Council, 2013) presents Powys County Council's review and assessment of air quality within its administrative area.
- 6.5.8** Powys County Council has identified one AQMA located at New Road, Newtown. Newtown is 38km south east of the site. In 2012, the Council recorded one exceedence of NO₂ 40µg/m³.

6.5.9 The Council has a small network of diffusion tube monitors in order to record air quality levels for NO₂.

6.5.10 Monitoring of Particulate Matter, Sulphur Dioxide, Benzene and other pollutants has not been undertaken by Powys County Council.

Gwynedd Council Air Quality Progress Report 2014

6.5.11 The Air Quality Progress Report 2014 (Gwynedd Council, 2014) presents Gwynedd Council's review and assessment of air quality within their administrative area.

6.5.12 There are no AQMAs within the planning authority area.

6.5.13 The Council has a small network of nitrogen dioxide diffusion tubes in order to record air quality levels for NO₂.

Air Quality Monitoring

Powys County Council

6.5.14 PCC undertakes air quality monitoring using passive diffusion tubes in areas considered to be at risk of exceeding the annual mean NO₂ objective throughout the county. No monitoring is undertaken by Powys County Council in the vicinity of the Scheme. The nearest air quality monitoring locations are located in Newtown, 38km south east of the Scheme.

Gwynedd Council

6.5.15 Gwynedd Council undertakes air quality monitoring using passive diffusion tubes in areas considered to be at risk of exceeding the annual mean NO₂ objective throughout the county. No monitoring is undertaken by Gwynedd Council in the vicinity of the Scheme, the closest monitoring locations is in Pwllheli, 50km north west of the Scheme.

6.5.16 In the absence of monitoring data, background pollutant mapping available from Defra for each 1km x 1km grid square across the UK has been used to determine the baseline air quality conditions in the area. As shown in

6.5.17 Table 6.8, background pollutant concentrations of NO₂ and PM₁₀ are well below the relevant air quality objectives (40µg/m³).

6.6 Potential Construction Effects - Before Mitigation

6.6.1 The site of the Scheme covers an area of approximately 35,000m². There is no demolition required as part of the Scheme.

The effects of earthworks, construction and trackout activities are considered in the following sections.

Sensitive Receptors

- 6.6.2** Sensitive receptors are defined as those properties that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the Scheme. No ecological receptors are identified within the study area of the construction dust assessment which would be sensitive to dust.
- 6.6.3** It is noted the Afon Dyfi is a potential pathway for species (including fish and other species such as the Minutest Diving Beetle) and designated sites approximately 4.5km downstream. The flow of water in the river is such that any dust deposited within the river is likely to be rapidly dispersed. It is therefore anticipated there will be no effect on species located in the vicinity of the Scheme or designated sites further downstream.
- 6.6.4** There are sensitive receptors within 350m of the Scheme and within 50m of the routes to be used by construction vehicles. The nearest sensitive receptors have been identified in Table 6.12 below, and their locations shown in Figure 6.2, Volume 2. These receptors are likely to receive the greatest impact due to their proximity to the construction site. However, the assessment of effects from trackout has also considered receptors through Machynlleth within 500m of the construction site.
- 6.6.5** The sensitivity of receptors to dust soiling and PM₁₀ exposure has been classified as high according to the criteria outlined in Table 6.3.

Table 6.12: Receptors Sensitive to Construction Dust

Receptor	Ref	Sensitive receptor	Distance (direction)
C1	3655	Residential Property on A487 bridge approach	20m to south-east
C2	9590	Residential property at A487 and A493 junction	140m to north-east
C3	5737	Residential properties on A487 North	115 m to north-east

Dust Emission Magnitude

- 6.6.6** Following the methodology outlined in section 6.4 and the criteria presented in Table 6.2, each dust-generating activity has been assigned a dust emission magnitude as shown in
- 6.6.7** Table 6.13. For earthworks, it has been assumed that these would occur in the whole site area as a worst case. For trackout, it has been assumed that construction vehicles would use the A487 for movements out of site.

Table 6.13: Dust Emission Magnitude for Construction Activities

Activity	Dust emission magnitude	Reasoning
Earthworks	Large	Total site area > 10,000m ² (approx. 35,000m ²) Variable made ground
Construction	Medium	Potentially dusty construction material to be used (concrete). Piling
Trackout	Medium	25 HDV (>3.5t) trips estimated in any one day. High clay content of surface material.

Sensitivity of the Area

6.6.8 The sensitivity of the area to dust soiling has been assigned as medium, due to the presence of a sensitive receptor within 20m of any dust generating activity. For trackout, which includes consideration of sensitive properties along the road network within 500m of the construction site itself which includes Machynlleth, the sensitivity of the area has been classified as high due to the presence of more than 10 sensitive receptors within 20m of the A487.

6.6.9 The projected background PM₁₀ concentrations in the 1km by 1km grid squares where the Scheme is located are between 9.9µg/m³ and 10.7µg/m³, which falls below the 24µg/m³ threshold. The sensitivity of the area to human health impacts has therefore been assigned as low. The overall sensitivity has been summarised as shown in Table 6.14.

Table 6.14: Sensitivity of the surrounding area to impacts on dust soiling and human health

Potential Impact	Sensitivity of the surrounding area		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	High
Human Health	Low	Low	Low

Risk of Dust Impacts

6.6.10 Using the criteria set out in the overall risk of dust impacts Table 6.6 the impacts on the area without mitigation are defined in Table 6.15. Taking into consideration the dust emission magnitude and the sensitivity of the area, the site has been classified as medium risk for dust soiling for all activities at worst. Specific mitigation is described in Section 6.9.

Table 6.15: Summary Dust Risk Prior to Mitigation

Activity	Dust risk prior to mitigation for dust soiling	Dust risk prior to mitigation for human health
Earthworks	Medium Risk	Low Risk
Construction	Medium Risk	Low Risk
Trackout	Medium Risk	Low Risk

6.7 Potential Operational Effects - Before Mitigation

6.7.1 The assessment of operational impacts has been undertaken using the inputs described in Section 6.4.

Predicted NO₂ Concentrations

6.7.2 Annual Mean NO₂ concentrations were predicted at the receptor locations for each scenario and are summarised in Table 6.16.

Table 6.16 Predicted Annual Mean NO₂ Concentrations

Receptor ID	Address	Predicted Annual Mean NO ₂ Concentration (µg/m ³)				
		2015 Base	2019 DM	2019 DS	2034 DM	2034 DS
OP1	Ysgoldy	8.2	8.1	6.4	8.4	6.4
OP2	5 Dyfi Cottages	8.1	8.0	6.2	8.3	6.2
OP3	4 Dyfi Cottages	8.0	7.9	6.3	8.2	6.3
OP4	2 Dyfi Cottages	7.7	7.6	6.3	7.9	6.3
OP5	1 Dyfi Cottages	7.6	7.5	6.3	7.7	6.3
OP6	3 Dyfi Cottages	7.9	7.8	6.3	8.0	6.3
OP7	Planning Pending	6.9	6.8	6.8	6.9	6.9
OP8	7 Dyfi Cottages	7.8	7.7	6.2	7.9	6.2
OP9	Pennant	6.0	5.9	5.6	6.1	5.7
OP10	8 Dyfi Cottages	7.6	7.5	6.2	7.8	6.2
OP11	Bryn Y Coed, Pont-ar-Ddyfi	6.0	5.9	5.5	6.1	5.7
OP12	6 Dyfi Cottages	8.6	8.5	6.3	8.9	6.2
OP13	Ysgoldy	7.9	7.8	6.3	8.0	6.3

Receptor ID	Address	Predicted Annual Mean NO ₂ Concentration (µg/m ³)				
		2015 Base	2019 DM	2019 DS	2034 DM	2034 DS
OP14	Y Fridd Farm	5.2	5.1	5.2	5.1	5.2
OP15	Newlyn, Station Road	6.9	6.8	6.8	7.0	7.0

6.7.3 As shown in Table 6.16 the only increase in annual mean NO₂ concentrations between the DM and DS scenarios is at receptor OP14. The increase is 0.1 µg/m³ in 2019 and 0.1 µg/m³ in 2035. This is because traffic that would use the existing Pont-ar-Ddyfi to travel between the A487 and the A493 in the DS situation is required to link between the roads via the new junction created at the north end of the Scheme. There is therefore an increase in traffic passing within approximately 150m of this receptor.

6.7.4 The largest decrease in annual mean NO₂ concentrations is 2.2 µg/m³ at receptor OP12 in 2019 and 2.7 µg/m³ in 2034. This decrease would occur as through traffic following the existing route of the A487 would be rerouted via the new Pont-ar-Ddyfi which is approximately 300m away from OP12.

6.7.5 The sensitivity test using IAN 170/12v3 has been used to confirm whether the assessment results require adjustment as a result of uncertainties in the future emission factors. Gap factors were derived using IAN 170/12v3 and applied to the NO₂ concentrations predicted at each receptor giving a corrected concentration to take account of future uncertainties in emission improvements.

Predicted PM₁₀ Concentrations

6.7.6 Annual Mean PM₁₀ concentrations were predicted at the receptor locations for each scenario and are summarised in Table 6.17.

Table 6.17: Predicted Annual PM₁₀ Concentrations

Receptor ID	Address	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)				
		2015 Base	2019 DM	2019 DS	2034 DM	2034 DS
OP1	Ysgoldy	11.1	10.8	10.5	10.6	10.3
OP2	5 Dyfi Cottages	11.1	10.8	10.5	10.6	10.3

Receptor ID	Address	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)				
		2015 Base	2019 DM	2019 DS	2034 DM	2034 DS
OP3	4 Dyfi Cottages	11.1	10.8	10.5	10.6	10.3
OP4	2 Dyfi Cottages	11.1	10.8	10.5	10.6	10.3
OP5	1 Dyfi Cottages	11.0	10.7	10.5	10.5	10.3
OP6	3 Dyfi Cottages	11.1	10.8	10.5	10.6	10.3
OP7	Planning Pending	10.9	10.6	10.6	10.4	10.4
OP8	7 Dyfi Cottages	11.1	10.8	10.5	10.5	10.3
OP9	Pennant	10.6	10.3	10.3	10.1	10.0
OP10	8 Dyfi Cottages	11.0	10.7	10.5	10.5	10.3
OP11	Bryn Y Coed, Pont-ar-Ddyfi	10.6	10.3	10.3	10.1	10.0
OP12	6 Dyfi Cottages	11.2	10.9	10.5	10.7	10.3
OP13	Ysgoldy	11.1	10.8	10.5	10.6	10.3
OP14	Y Fridd Farm	10.5	10.2	10.2	9.9	9.9
OP15	Newlyn, Station Road	10.9	10.6	10.6	10.4	10.4

6.7.7 As shown in Table 6.17 there is no increase in annual mean PM₁₀ concentrations between the DM and DS scenarios. At the majority of locations annual mean PM₁₀ concentrations decrease slightly with no change at two receptors.

6.7.8 The largest decrease in concentrations is 0.4 µg/m³ and occurs at OP12 in 2019 and 0.4 µg/m³ in 2034. This decrease is due to the future through traffic using the A487 being rerouted along the New Pont-ar-Ddyfi instead of passing next to the group of residential properties at the north end of the existing Pont-ar-Ddyfi.

Assessment of Significance

6.7.9 IAN 174/13 provides guidance on evaluating overall Scheme significance. The overall significance of the Scheme is based on all elements of the Scheme that have been assessed and the results discussed above.

6.7.10 The magnitude of change in NO₂ and PM₁₀ concentration at each receptor has been described below in Table 6.18 and Table 6.19.

For NO₂ the majority of changes are either minor beneficial or negligible, with one moderate beneficial change in 2019 and three moderate beneficial changes in 2034. For PM₁₀ all changes in years are considered negligible. There are no adverse effects predicted for either NO₂ or PM₁₀ concentrations as a result of the Scheme.

Table 6.18: Magnitude of Change in NO₂

Receptor ID	Address	Change in Annual Mean NO ₂ Concentration (µg/m ³)			
		2019 change	Magnitude	2034 change	Magnitude
OP1	Ysgoldy	-1.7	Minor beneficial	-2.0	Moderate beneficial
OP2	5 Dyfi Cottages	-1.8	Minor beneficial	-2.1	Moderate beneficial
OP3	4 Dyfi Cottages	-1.6	Minor beneficial	-1.9	Minor beneficial
OP4	2 Dyfi Cottages	-1.3	Minor beneficial	-1.6	Minor beneficial
OP5	1 Dyfi Cottages	-1.1	Minor beneficial	-1.4	Minor beneficial
OP6	3 Dyfi Cottages	-1.5	Minor beneficial	-1.8	Minor beneficial
OP7	Planning Pending	0.0	Negligible	0.0	Negligible
OP8	7 Dyfi Cottages	-1.4	Minor beneficial	-1.7	Minor beneficial
OP9	Pennant	-0.4	Negligible	-0.4	Negligible
OP10	8 Dyfi Cottages	-1.3	Minor beneficial	-1.6	Minor beneficial
OP11	Bryn Y Coed, Pont-ar-Ddyfi	-0.4	Negligible	-0.4	Negligible
OP12	6 Dyfi Cottages	-2.2	Moderate beneficial	-2.7	Moderate beneficial
OP13	Ysgoldy	-1.5	Minor beneficial	-1.8	Minor beneficial
OP14	Y Fridd Farm	0.1	Negligible	0.1	Negligible
OP15	Newlyn, Station Road	0.0	Negligible	0.0	Negligible

Table 6.19: Magnitude of Change in PM₁₀

Receptor ID	Address	Change in Annual Mean NO ₂ Concentration (µg/m ³)			
		2019 change	Magnitude	2034 change	Magnitude
OP1	Ysgoldy	-0.3	Negligible	-0.4	Negligible
OP2	5 Dyfi Cottages	-0.3	Negligible	-0.4	Negligible
OP3	4 Dyfi Cottages	-0.3	Negligible	-0.3	Negligible
OP4	2 Dyfi Cottages	-0.3	Negligible	-0.3	Negligible
OP5	1 Dyfi Cottages	-0.2	Negligible	-0.2	Negligible
OP6	3 Dyfi Cottages	-0.3	Negligible	-0.3	Negligible

Receptor ID	Address	Change in Annual Mean NO ₂ Concentration (µg/m ³)			
		2019 change	Magnitude	2034 change	Magnitude
OP7	Planning Pending	0.0	Negligible	0.0	Negligible
OP8	7 Dyfi Cottages	-0.3	Negligible	-0.3	Negligible
OP9	Pennant	-0.1	Negligible	-0.1	Negligible
OP10	8 Dyfi Cottages	-0.2	Negligible	-0.3	Negligible
OP11	Bryn Y Coed, Pont-ar-Ddyfi	-0.1	Negligible	-0.1	Negligible
OP12	6 Dyfi Cottages	-0.4	Negligible	-0.5	Negligible
OP13	Ysgoldy	-0.3	Negligible	-0.3	Negligible
OP14	Y Fridd Farm	0.0	Negligible	0.0	Negligible
OP15	Newlyn, Station Road	0.0	Negligible	0.0	Negligible

6.7.11 No exceedences of the air quality objectives are predicted with or without the Scheme in place in any of the scenarios assessed. As such it is not necessary to complete Table 2.2 from IAN 174/13 (Highways Agency, 2013b), as this is only concerned with receptor locations at which the objectives are predicted to be exceeded.

6.7.12 The key criteria questions for evaluating significance are set out and results for each summarised in Table 6.20.

Table 6.20: Evaluation of Significance

Key Criteria Questions	Yes/No	Reasoning
Is there a risk that environmental standards will be breached?	No	No exceedences of air quality objectives are predicted as a result of the Scheme
Will there be a large change in environmental conditions?	No	The Scheme does not result in a large change (>4µg/m ³) in pollutant concentrations.
Will the effect continue for a long time?	Yes	The effect of the Scheme would be permanent, however the effect of the Scheme on local air quality is not predicted to be significant.
Will many people be affected?	No	At the majority of receptors the Scheme would have a beneficial impact. There are few receptors given the rural location of the Scheme.
Is there a risk that designated sites, areas, or features will be affected?	No	There are no designated sites present within the study area.
Will it be difficult to avoid, or reduce or repair or compensate for the effect?	No	No adverse effects have been identified which would require mitigation.
On balance is the overall effect significant?	No	

6.8 Mitigation and Monitoring

Construction Mitigation

6.8.1.1 The dust emitting activities assessed in Section 6.6 can be greatly reduced or eliminated by applying the site-specific mitigation measures for medium risk sites according to the IAQM guidance. The following measures from the guidance are relevant and should be included in a Construction Environmental Management Plan (CEMP) for the site.

General

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;
- Display the head or regional office contact information; and
- Develop and implement a Dust Management Plan, which will include measures to control other emissions, approved by the local authority.

Site management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- Make the complaints log available to the local authority when asked; and
- 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.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary;
- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and

make an inspection log available to the local authority, when asked;

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority, where required. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Site maintenance

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site; and
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on un-surfaced haul roads and work areas;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;

- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling walking and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques, such as water sprays or local extraction;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use the fine water sprays on such equipment wherever appropriate; and
- Ensure equipment is readily available on site to clean and dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use hessian, mulches and trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and
- Only remove the cover in small areas during work and not all at once.

Construction

- Avoid scabbling (roughening of concrete surfaces) if possible;
- 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; and
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in soils with suitable emission control systems to prevent escape of material and overfilling during delivery.

Trackout

- Use water-assisted dust sweepers on the access and local roads, to remove, as necessary, any material transferred out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Install hard surfaces haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement and wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- 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; and
- Access gates to be located at least 10m from receptors where possible.

Waste management

- Avoid bonfires and burning of waste materials.

Operational Mitigation

6.8.2 The operational assessment has shown that there are no significant effects, therefore no mitigation is required or proposed.

6.9 Construction Effects - With Mitigation

6.9.1 Following implementation of the proposed mitigation in Section 6.8, no significant effects are anticipated during the construction phase.

6.10 Operational Effects - With Mitigation

6.10.1 As discussed in Section 6.8.2, the operation of the Scheme does not result in any significant effects on local air quality and

therefore mitigation is not required. Consequently the operational effects would be as predicted and would remain insignificant.

6.11 Assessment of Cumulative Effects

6.11.1 No other developments have been identified which could generate cumulative effects with the Scheme during the construction phase.

6.11.2 The traffic data that informs the air quality assessment includes a growth factor to account for new developments and increased use of motorised vehicles in the local area. This was applied to the opening and future year traffic data used in the assessment. No developments have been identified that could cause cumulative effects during the operational phase.

6.12 Inter-relationships

6.12.1 Designated ecological sites can be affected by changes in air quality. There are no designated sites within the study area, therefore, no inter-relationships are anticipated for the Scheme.

6.12.2 It is noted that the Afon Ddyfi passes through the study area and connects with several designated sites approximately 4.5km downstream. It is unlikely that any dust arising from construction would be deposited into the river after mitigation. Any dust entering the river at the site of the Scheme would become so dispersed through the downriver course that the impacts of dust on designated sites downstream would be negligible.

6.12.3 Possible impacts of the Scheme on designated sites are addressed in the Assessment of Implications on European Sites (AIES) and Chapter 9 Nature Conservation of this ES.

6.13 Summary

6.13.1 A review of current relevant legislation and planning policy, a baseline assessment describing the current air quality conditions in the vicinity of the Scheme and an assessment of the likely air quality impacts associated with the construction and operation of the Scheme have been undertaken.

6.13.2 Existing pollutant concentrations in the study area are low, and air quality objectives are currently met. There are no AQMAs close to the Scheme.

6.13.3 The construction effects have been assessed using the qualitative approach described in the latest IAQM guidance and it was concluded that with mitigation measures appropriate for a medium risk site in place there is likely to be no significant effect from the dust-generating activities on site.

6.13.4 Potential impacts during the operational phase of the Scheme have been assessed to be not significant as modelled pollutant concentrations are well below the air quality objectives.