Dogger Bank C/Sofia
Onshore Works Application

Appendix 9 -

Air Quality Assessment

Table of Contents

1 Introduction

1.1 Purpose of the Report

This Report accompanies the Environmental Appraisal which is submitted to support the planning application (the Application) made by Doggerbank Offshore Wind Farm Project 3 Projco Limited (the Projco) and Sofia Offshore Wind Farm Limited (SOWFL) (the Applicants), for consent pursuant to Section 62 of the Town and Country Planning Act 1990 as amended[1].

A Development Consent Order (2015 DCO) was granted for Dogger Bank Wind Farm C (previously known as Dogger Bank Teesside A Offshore Wind Farm) and Sofia Offshore Wind Farm (previously known as Dogger Bank Teesside B Offshore Wind Farm) (the Applicants' Projects), including the onshore transmission works required to export electricity to the National Grid in August 2015.

The Application includes five areas of alternative and additional infrastructure to the consented 9 kilometres (km) buried onshore grid connection, spanning from the landfall for Dogger Bank Wind Farm C (DB-C) and Sofia Offshore Wind Farm (Sofia) to the National Grid at Lackenby Substation (the Works).

This Report provides a focused appraisal considering the potential air quality effects of each of the five areas against the consented effects deemed acceptable by the consented 2015 DCO. The purpose of this Report is to provide a high-level characterisation of the existing conditions, assess the potential effects of the Works against the consented 2015 DCO and where necessary and appropriate propose mitigation measures to avoid, reduce or minimise potential effects.

This air quality assessment specifically addresses:

- Potential construction and demolition dust emissions; and
- Emissions arising from traffic produced as a result of the Works during construction.

1.2 Development Context

For the ease of reference, the Works, as shown in Figure 1.2 (a – c) of the Environmental Appraisal, is split into areas as below:

- Area 1 – A174 Crossing;
- Area 2 – South of Kirkleatham Memorial Park;
- Area 3 - Wilton East;
- Area 4 - Main Welfare Hub south of Wilton; and
- Area 5 - HVAC Cable Corridor.

[1] UK Government (1990) Town and Country Planning Act 1990 [Online] Available at: http://www.legislation.gov.uk/ukpga/1990/8/contents (Accessed on 11/05/2020)

1.3 Document Structure

This Report is structured as follows:

- Introduction;
- Methodology;
- Baseline for Assessment;
- Assessment of Potential Effects;
- Mitigation and Enhancement;
- Cumulative Effects; and
- Summary and Statement of Change/No Change.

This Report is accompanied by Annex A (Figure 1 – Receptors and Modelled Roads) and Annex B, detailing the methodology of the construction dust risk assessment and Design Manual for Roads and Bridges (DMRB) assessment of construction traffic emissions, along with the assessment data inputs and results.

This Report should be read in conjunction with Chapter 30 of the 2014 ES[2] which provides the assessment of Air Quality for the 2015 DCO.

2 Methodology

2.1 Scoped Out

Potential construction effects in respect of Non-Road Mobile Machinery (NRMM), operational effects and decommissioning effects are scoped out of the assessment, on the basis of the findings of the 2014 ES, summarised below with respect to the Works:

- Existing background levels of pollutants were well below the respective Air Quality Objectives (AQO) and any emissions from NRMM would be both localised and short-term in duration during the operation of plant. Exhaust emissions of Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}) from the proposed NRMM were considered to be negligible;
- Following completion of construction, local traffic will return to existing flows and volumes. There will be minimal maintenance and site traffic. As such, maintenance and site traffic were found to have a negligible effect on local air quality in the 2014 ES; and
- As per the 2014 ES, at the time of decommissioning it will be evaluated whether the buried cable system could be used for another purpose. The decommissioning of the cable route and will form part of an overall Decommissioning Plan. As such, decommissioning has been scoped out of this assessment.

Effects on dust as a result of demolition have been scoped out of the assessment as no demolition is to be carried out as part of the Works.

Only traffic and construction dust effects arising from concurrent construction of the Works have been considered as this represents the largest increase in two way vehicle movemnts and the largest potential for construction dust emissions.

[2] Forewind (2014) Chapter 30 – Air Quality, Dogger Bank Tesside A & B ES

2.2 Comparison with 2014 ES Methodology

2.2.1 Construction Dust Methodology

In 2014, the Institute of Air Quality Management (IAQM) published a guidance document 'Guidance on the Assessment of Dust from Demolition and Construction', which has been used to undertake the assessment of potential dust emissions in accordance with best practice. Descriptors for magnitude and significance used for the assessment of air quality in the assessment of potential construction phase dust emissions are taken from the IAQM guidance. The full methodology and technical assessment are detailed in Annex B.

The methodology used for this assessment differs to the methodology presented in the 2014 ES. The methodology used in the 2014 ES assessed the risk of dust emissions on specific receptors. The more recent IAQM guidance assesses the potential effects with consideration to the proximity and number of receptors (i.e. not specific receptors).

In order to assess any possible change from the 2014 ES, the predicted effects for each receptor will be assessed against the predicted effects of the Works, determined using the methodology set out in the latest IAQM guidance.

2.2.2 Construction Phase Traffic

Construction phase traffic emissions (NO_2 and PM_{10}) were assessed as part of the 2014 ES using the DMRB screening method. Given the scale and nature of the Works, the use of the DMRB screening method is considered acceptable for assessing the potential emissions of construction traffic. The pollutants originally modelled have been modelled for the Works, using updated traffic flows and receptors.

As it is consistent with the 2014 ES, the DMRB screening method has been used as an initial test to establish whether a more detailed assessment of traffic emissions is required. This considers concentrations of NO_2 and PM_{10} to enable comparison with AQOs. Other pollutants have been scoped out of the assessment as not applicable to the nature of the Works. If it is predicted that the air quality criteria would be exceeded, then the DMRB advises that detailed modelling is undertaken.

A full description of the DMRB screening method, receptors, traffic data and results is detailed in Annex B, and is consistent with the methodology used in the 2014 ES.

3 Baseline for Assessment

3.1 Summary of the 2014 ES Baseline

3.1.1 Local Authority Monitoring

As part of the 2014 ES, a review of local air quality monitoring undertaken by Redcar and Cleveland Borough Council (RCBC) was undertaken. A single automatic monitoring location was identified in Dormanstown, a Suburban Industrial Location approximately 500 m from the 2015 DCO (relocated from a location at Corporation Road in late 2011).

Analysis of the automatic monitoring data showed no exceedances of annual mean or short-term AQO for NO_2 and PM_{10} at either the Dormanstown or Corporation Road locations, with a maximum annual mean NO_2 concentration of 17.4 µg/m^3 and a maximum annual mean PM_{10} concentration of 20.1 µg/m^3.

NO_2 diffusion tube monitoring was not undertaken by RCBC at the time of the 2014 ES due to the relatively low traffic densities in areas of relevant public exposure.

No background monitoring locations were identified for the 2014 ES and therefore, background pollutant concentrations were obtained from concentration maps provided by Defra for the ten 1 km grid squares covering the full extent of the 2015 DCO (and also the Works).

3.1.2 Defra Background Maps

Background NOx, NO_2 and PM_{10} concentrations were identified using the Defra background maps provided on the UK-AIR, the Air Information Resource. Background concentrations were taken from each of the ten 1 km grid squares that contained the 2015 DCO (and also the Works). Background NOx concentrations were used in the conversion of modelled NOx road vehicle contributions to NO_2. Background NO_2 and PM_{10} values were below their respective AQOs at all locations within the Study Area for the 2014 ES, with the maximum background NO_2 concentration being recorded as 35.6 µg/m^3 with a maximum background PM_{10} concentration of 18.9 µg/m^3.

3.2 Baseline for this Assessment

3.2.1 Background Air Quality

3.2.1.1 Local Authority Monitoring Data

RCBC's latest available annual Air Quality Status Report (2019)[3] provides detail on the range of monitoring undertaken in order to meet the requirements of the Local Air Quality Management (LAQM) statutory process.

RCBC operate a network of sites monitoring NO_2, and PM_{10} continuously using a combination of passive techniques (diffusion tubes) and automatic monitoring. As with the 2014 ES, automatic monitoring is only undertaken at the one location. Diffusion tube monitoring is now undertaken across the Borough which was not carried out at the time of the 2014 ES.

Continuous monitoring for NO_2 is undertaken at Dormanstown, a suburban location approximately 500 m northwest of the Works (approximate NGR 458379, 523486). A summary of the results is given in Table 3.1.

Table 3.1: Automatic Monitoring Results

Location	NO_2 Concentration (µg/m3)				
	2014	2015	2016	2017	2018
Redcar Dormanstown	11	11	8.9	8.4	8.4

[3] RCBC (2019) Annual Air Quality Status Report [Online] Available at; https://www.redcar-cleveland.gov.uk/resident/environmental-protection/air-quality/Documents/Air%20Quality%20Report.pdf (Accessed June 2020)

The data shows concentrations decreased between 2014 and 2018 and concentrations remained well below the mean annual AQO for NO_2, (at less than 21% of the AQO).

RCBC now undertake non-automatic monitoring of NO_2 using diffusion tubes. Of these, the closest to the Works is R40 at Keilder Close (approximate NGR 459909, 522873), a roadside location approximately 800 m north of the Works. A summary of these results is given in Table 3.2.

Table 3.2: Diffusion Tube Results

Location	NO2 Concentration (µg/m3)				
	2014	**2015**	**2016**	**2017**	**2018**
R40	-	-	-	-	16.5

Monitoring at R40 commenced in 2018 with a concentration well below the mean annual AQO for NO_2, (at less than 42% of the AQO).

RCBC monitoring data is not considered representative of background concentrations of pollutants at the Works. All monitoring sites are in close proximity to traffic emissions. As traffic emissions are to be specifically modelled as part of the DMRB assessment, the monitoring locations are not representative of background concentrations at the location of the Works (as detailed in Section 3.2.1.3).

3.2.1.2 Defra Background Maps

Additional information on estimated background pollutant concentrations has been obtained from the Defra background maps provided on the UK-AIR, the Air Information Resource[4].

Estimated air pollution concentrations for NO_2 and PM_{10} have been extracted from the background pollution maps for the UK. These maps are available in 1 km by 1 km grid squares. Data has been obtained for 2020 as an average, minimum and maximum of all the grid squares in which the Works and surrounding receptors are located, and is provided in Table 3.3.

Table 3.3: Background Pollutant Concentrations from Defra mapping

Pollutant	2020 Concentration (µg/m^3)		
	Average	**Minimum**	**Maximum**
Nitrogen dioxide (NO_2)	12.0	9.3	15.2
Particulates (PM_{10})	12.4	11.1	13.5

The data indicates that existing background concentrations in the area surrounding the Works and the surrounding receptors are well below the AQOs for NO_2 and PM_{10}.

[4] Defra (2018) Background mapping data for local authorities - 2017 [Online] Available at: https://uk-air.defra.gov.uk/data/laqm-background-home (Accessed June 2020)

3.2.1.3 Summary

As vehicle emissions have been explicitly modelled, both the automatic monitoring station and diffusion tube locations are considered inappropriate to use as background values. As they are located in suburban and roadside sites, they will have already accounted for pollutant concentrations arising from vehicle emissions, and would therefore lead to double counting of emissions if used as a background to modelled traffic emissions as a result of the Works.

As such, 2020 annual mean background concentrations, obtained from Defra background maps and presented in Table 3.3, has been used in this assessment. Conservatively the assessment has used the following maximum concentrations across all grid squares in which the Works and surrounding receptors are located:

- 2020 NO_2: 15.2 µg/m^3; and
- 2020 PM_{10}: 13.5 µg/m^3.

3.2.2 Baseline Traffic Data

Baseline traffic flows for the Works have been supplied by SCP Transport provided in Appendix 7 to the Environmental Appraisal. This information was supplied as Annual Average Daily Traffic (AADT) traffic flows for a baseline year of 2020 and predicted flows during the construction of the Works. The generated traffic flows that have been reported are associated with the Works traffic but also the wider traffic flows for the 2015 DCO.

The baseline traffic data used in this assessment is summarised in Table 3.4.

Table 3.4: Background Traffic Data Used in DMRB Model

Road	Vehicle Speed (km/h)	Baseline Flows (2020)		Baseline plus Construction Traffic (2020)	
		AADT	% HGV	AADT	% HGV
A1053 (Greyston Road)	48	13,967	7.9	14,240	9.6
B1380 (High Street)	48	9,209	4.2	9,332	4.7
A174	48	31,052	5.3	31,306	6.0
A174 (South of Wilton)	48	43,340	2.5	43,822	3.1
A1042 (Kirkleatham Lane)	48	15,106	1.8	15,177	1.8
A174 (south of Redcar)	48	30,257	1.8	30,438	2.0
B1269 (Fishponds Road)	48	6,773	2.4	6,808	2.7
Grewgrass Lane	48	4,290	0.3	4,303	0.4
Redcar Road	48	8,762	1.6	8,775	1.7
A1085 (Coast Road)	48	9,178	1.1	9,242	1.2
A174 (south of Marske)	48	14,497	2.3	14,555	2.3
A174 (south of Redcar)	48	30,257	1.8	30,387	1.9

3.2.3 Baseline Air Quality

The baseline air quality has been modelled using the DMRB screening assessment, for each of the receptors in the 2020 baseline. The modelling was based on the traffic data provided in Table 3.4. The results are presented in Table 3.5.

Table 3.5: Baseline Air Quality at Receptor Locations

Receptor	Annual Mean NO_2 ($\mu g/m^3$)	Annual Mean PM_{10} ($\mu g/m^3$)
	2020	2020
1 High Street	17.1	14.1
43 Keepersgate	18.7	14.8
19 Chesnut Close	18.1	14.4
Grewgrass Farm	15.8	13.7
13 Kirkwood Drive	17.2	14.2
Rosedene Farm	15.3	13.5
524 West Dyke Road	16.9	14.2
54 Larkswood Road	16.8	14.0
27 Talisker Gardens	16.3	13.9
155 Redcar Road	16.7	14.1

The data in Table 3.5 indicates that baseline NO_2 and PM_{10} levels in 2020 are considerably below the AQOs. The levels are lower than the baseline in the 2014 ES. For example, the previous realistic worst case NO_2

concentration (at a 2014 ES receptor included in this assessment) was 19.10 µg/m^3 at 1 High Street. Whereas the modelled baseline in this assessment for this receptor is 17.1 µg/m^3.

The previous realistic worst case PM_{10} concentration (at a 2014 ES receptor included in this assessment) was 16.33 µg/m^3 at 13 Kirkwood Drive; the modelled baseline in this assessment for this receptor is 14.2 µg/m^3.

Therefore, there has been an improvement in the baseline air quality conditions in the vicinity of the Works since the 2014 ES.

4 Assessment of Potential Effects

4.1 Summary of 2014 ES Effects

4.1.1 Construction Phase Dust Assessment

In accordance with guidance in place at the time of the 2014 ES, all nearby receptors were identified as being of medium sensitivity to construction dust.

Each source activity was given a Dust Emission Class (DEC). Construction and trackout were of large DEC and earthworks were of medium DEC. Each activity was then given a risk classification - high risk for earthworks and trackout; and low risk for construction.

The risk of the Works giving rise to dust effects was then calculated using an assessment matrix and considered before and after mitigation. The significance of the risk of giving rise to dust effects was negligible for all source activities after appropriate mitigation, and was described overall as negligible.

4.1.2 Construction Phase Traffic Assessment

Predictions of traffic emissions arising as a result of construction traffic associated with the Works were made using the DMRB screening tool.

The assessment considered the section of the road network most likely to experience the highest increase in traffic volume as a consequence of the 2015 DCO, as set out in the associated Transport Assessment as part of the 2014 ES. Resulting concentrations were predicted at 10 receptors and the effect of construction vehicles on local air quality at all identified receptors was identified as negligible.

4.2 Effects arising from the Works

4.2.1 Construction Phase Dust Assessment

Full details of the assessment of construction and demolition dust are presented in Annex B. Table 4.1 provides a summary of risk impact (for impacts as Dust Soiling and on Human Health, without mitigation) for the activities that will be required as part of the Works.

Table 4.1: Summary of Dust Risk Impact

Source	Dust Soiling	Human Health
Earthworks	Low (Onsite works)	Low (Onsite works)
Construction	Low (Onsite works)	Low (Onsite works)
Trackout	High	Medium

As was the case for the guidance used in the 2014 ES, the current IAQM guidance states that with appropriate mitigation in place the residual effect will normally be negligible.

The mitigation measures already proposed as part of the 2015 DCO are based on the IAQM guidance and are deemed to be appropriate to the scale of the risk as assessed. With these measures in place, and effectively implemented, the residual effects are judged to be negligible.

The IAQM guidance acknowledges that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective 100% of the time, particularly under adverse weather conditions. During adverse weather, short-term adverse dust effects may occur (e.g. annoyance). However, the occurance and scale of adverse weather events is not considered sufficient to change the conclusion that overall effects of construction dust remain neglgible.

This constitutes no change from the findings of the 2014 ES with regards to the potential effect of construction phase dust emissions.

4.2.2 Construction Phase Traffic Assessment

This assessment considers the section of the road network most likely to experience the highest increase in traffic volume as a consequence of the Works. Details on traffic data, receptors and other factors including full tables of results are presented in Annex B.

No exceedances of the annual mean NO_2 and PM_{10} AQOs are predicted at any identified receptor as a result of the Works. The additional traffic generated by the Works is predicted to lead to an addition of a maximum of 0.2 µg/m^3 to the annual mean NO_2 concentration (43 Keepersgate), which equates to 0.5% of the AQO. There is only an increase in NO_2 concentration at two further receptors (0.1 µg/m^3) with seven of the receptors not being subject to any change as a result of the Works. This is considered to be a negligible effect, being 0.5% of the long-term AQO. The maximum NO_2 concentration modelled with the Works traffic was 18.7 µg/m^3, which is 46.8% of the long-term AQO.

The additional traffic generated by the Works above the 2020 baseline scenario is predicted to lead to an addition of 0.1 µg/m^3 to the annual mean PM_{10} concentration at 1 High Street and 13 Kirkwood Drive, which equates to 0.25% of the AQO. There is no change in concentration at the other eight receptors when the Works traffic is added to the 2020 baseline. This is considered to be a negligible effect, being 0.25% of the long-term AQO. The maximum PM_{10} concentration modelled was 14.8 µg/m^3 at 43 Keepersgate, which is 37% of the long-term AQO.

The air quality effects arising as a result of traffic emissions associated with the Works will therefore be negligible at the identified receptors and no further detailed modelling or assessment is required. This represents no change from the findings of the 2014 ES with regards to traffic emissions from the Works.

5 Mitigation and Enhancement

5.1 Summary of Mitigation from the 2014 ES

The 2014 ES identified potential mitigation measures for the effects of construction dust arising from earthworks, trackout and NRMM to be included in a Construction Environmental Management Plan (CEMP) to ensure that the effect of any potential dust impacts from the Works on the surrounding environment remain negligible.

As the 2014 ES, predicted impacts of construction traffic emissions at exiting offsite receptors to be negligible, it concluded that it was not necessary to propose any mitigation for road vehicle exhaust emissions.

5.2 Additional Enhancement Measures from this Application

As there is to be no change from the results of the findings of the 2014 ES, there is no need to update the mitigation measures proposed for inclusion in the CEMP. The CEMP will be extended to cover the Works and are in accordance with the current IAQM guidance.

Construction phase vehicle emissions have been assessed and the air quality effects on existing receptors is predicted to be negligible, and as such it is not necessary to propose any mitigation for road vehicle exhaust emissions.

There has been no change to the mitigation measures proposed in the 2014 DCO.

6 Cumulative Effects

6.1 Summary of Cumulative Effects in the 2014 ES

The potential for cumulative effect was assessed as part of the 2014 ES. Thirty-two (32) relevant projects were identified and considered for the assessment of cumulative effects on air quality, of which eight were considered to have the potential to result in cumulative air quality effects.

The 2014 ES considered the cumulative effects of construction and demolition dust to only be relevant for projects within 50 to 100 m of the 2015 DCO, and that are under construction concurrently with the 2015 DCO. Several projects were identified as being within close enough proximity to require consideration however, it was concluded that all of these sites would be required to implement a CEMP and be subject to legal requirements for management of construction activities.

The utilised IAQM guidance (IAQM 2012a) which formed the basis for the 2014 ES assessment, stated that once appropriate site specific mitigation measures have been defined the residual effect will be negligible for most sites. Therefore, even if the cumulative schemes were to be constructed concurrently, any cumulative offsite dust impacts would be negligible.

Traffic flows modelled in the construction phase traffic assessment included traffic from some of these committed developments. This assessment found the effects of construction traffic from the 2015 DCO to be negligible therefore, any cumulative effects can be described as negligible as they have already been incorporated into the assessment.

6.2 Additional Cumulative Projects

Traffic flows modelled in the construction phase vehicle exhaust emissions assessment includes the traffic from committed developments. There has been no change in the effects of traffic emissions associated with the Works and as such, there has been no change to the negligible cumulative effects identified in the 2014 ES.

Current IAQM guidance is clear that with appropriate mitigation in place the residual dust effect will normally be not significant. As such, even if any additional sites were to have been approved for concurrent construction within close proximity to the Works, the obligation of those sites to provide appropriate levels of mitigation would render any residual effects from construction and demolition dust not significant. As such, the cumulative offsite dust impacts would remain negligible.

There has been no change to the significance of cumulative air quality effects arising from the Works in conjunction with other nearby projects.

7 Summary and Statement of Change/No Change

Table 7.1 provides a comparison of the 2014 ES effects and the effects as a result of the Works, concluding as to whether there is a change or not to the 2014 ES conclusions.

Table 7.1: Comparison of Effects

Assessment/ Receptor	2014 ES Effect Significance	Effects as a Result of the Works	Change/No Change to ES Conclusion
Construction Phase Dust Emissions.	Negligible at all receptors, following mitigation.	Negligible at all receptors, following mitigation.	No Change.
Traffic Emissions	Negligible at all receptors.	Negligible at all receptors.	No Change.

The Works will not change the conclusions of the 2014 ES in relation to construction effects on air quality as no new materially different effects on the environment have been identified.

DOGGER BANK WIND FARM
BY
sse Renewables equinor

SOFIA OFFSHORE WIND FARM

- Planning Application Boundary
- DCO Boundary
- Modelled Road
- Air Quality Receptor (2020)
- Air Quality Receptor (2014)

1:30,000 Scale @ A3

0 0.5 1 km

NORTH

ARCUS

Produced By: FC	Ref: 3802-REP-003
Checked By: SC	Date: 01/07/2020

Receptors and Modelled Roads
Figure 1

Dogger Bank C and Sofia Onshore Works Application
Air Quality Technical Appendix

P:\Projects\Environment\Air Quality Assessments\Air Quality Projects.aprx\3802-REP-003 Fig01 Receptors and Modelled Roads

Dogger Bank C/Sofia Onshore Works Application

Appendix 9 – Annex B

Air Quality

Table of Contents

1 Introduction

This report accompanies the Environmental Appraisal which is submitted to support the planning application (the Application) made by Doggerbank Offshore Wind Farm Project 3 Projco Limited (the Projco) and Sofia Offshore Wind Farm Limited (SOWFL) (the Applicants), for consent pursuant to Section 62 of the Town and Country Planning Act 1990 as amended .

A Development Consent Order (2015 DCO) was granted for Dogger Bank Wind Farm C (previously known as Dogger Bank Teesside A Offshore Wind Farm) and Sofia Offshore Wind Farm (previously known as Dogger Bank Teesside B Offshore Wind Farm) (the Applicants' Projects), including the onshore transmission works required to export electricity to the grid in August 2015.

The Application includes five areas of alternative and additional infrastructure to the consented 9 kilometres (km) buried onshore grid connection, spanning from the landfall for Dogger Bank Wind Farm C (DB-C) and Sofia Offshore Wind Farm (Sofia) to the National Grid at Lackenby Substation (the Works). Figures 1.2 (a - c) of the Environmental Appraisal show the location of the Works and the consented 2015 DCO.

This report sets out the methodology used and results of the assessment of construction and demolition dust and the assessment of construction traffic to support the air quality report assessing the effects of the Works.

2 Methodology

2.1 Construction Phase Dust Emissions

2.1.1 Assessment Methodology

In 2014, the IAQM published a guidance document 'Guidance on the Assessment of Dust from Demolition and Construction', which has been used to undertake the assessment of dust emissions in accordance with best practice. Descriptors for magnitude and significance used for the assessment of air quality in the assessment of construction phase dust emissions are taken from the IAQM guidance and detailed within this section.

The term 'effects' is utilised within the guidance as it refers to the consequence of changes in airborne concentrations and/or dust deposition for a receptor. The guidance refers to impacts as the change in concentrations irrespective of whether there are effects on receptors. This terminology is used within this assessment.

Activities on construction sites have been divided into four separate types to reflect their different effects, each of these types of activity are assessed individually, including:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (the transport of dust and dirt from a construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. IAQM guidance states that significant particulate track-out may occur up to 500 m from large sites, 200 m from medium sites and 50 m from small sites.)

Given that no demolition is required for the Works, the assessment does not consider dust impact from demolition activities and therefore this activity is scoped out of the assessment.

The dust risk assessment assesses the following three impact risks:

- The risk of dust impact to human and property receptors;
- The risk of dust impact to ecological receptors; and
- The risk of dust impact to human health.

This is comprised of a qualitative method using a set of matrices and is repeated for each of the three activities involved (Earthworks, Construction, and Trackout).

The methodology has been organised into a stepped approach and the assessment was conducted as follows:

- Step 1: Screen the need for detailed assessment;
- Step 2: Assess the risk of dust effects arising;
- Step 3: Identify the need for site-specific mitigation; and
- Step 4: Define effects and their significance.

STEP 1 of the assessment screens the requirement for a more detailed assessment. Due to the presence of "human receptors" within 350 m of the boundary of the Works and within 100 m of the route used by construction vehicles on the public highway (up to 500 m), a dust assessment is necessary for the Works.

STEP 2 is to assess the risk of dust effects on these sensitive receptors and assign a risk category to the Works. The risk category is determined by several factors:

- The scale and nature of the works, which determines the risk of dust arising (the dust emission magnitude as shown in Table 2.1); and
- The proximity of sensitive receptors to these potential risks.

The classification of dust emission magnitude is determined based on the area size and dust raising potential of the earthworks and construction activities, resulting in either a small, medium or large magnitude (Table 2.1).

Table 2.1: Determination of dust emission magnitude

Activity	**Criteria used to determine dust emission magnitude**		
	Large	**Medium**	**Small**
Earthworks	Total site area >10,000 m2. Potentially dusty soil type. >10 heavy earth moving vehicles active at any one time. Formation of bunds >4 m – 8 m in height. Total material moved >100,000 tonnes	Total site area 2,500 – 10,000m2, moderately dusty soil type (e.g. silt). 5-10 heavy earth moving vehicles active at any one time. Formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.	Total site area <2,500m2. Soil type - large grain size (e.g. sand). <5 heavy earth moving vehicles at any time of day. Surface material - with low potential for dust release. Surface material with low potential for dust release. Unpaved road length <50 m.
Construction	Total building volume >100,000 m3. On site concrete batching. Dusty	Total building volume 25,000 – 100,000 m3. Potentially dusty construction material (e.g.	Total building volume <25,000 m3. Construction material with low potential

Activity	Criteria used to determine dust emission magnitude		
	Large	**Medium**	**Small**
	construction material. Sandblasting.	concrete). On site concrete batching.	for dust release (e.g. metal cladding or timber).
Trackout	>50 HDV (>3.5t) outward movements in any one day. Potentially dusty surface material (e.g. high clay content). Unpaved road length 50 m – 100 m.	10-50 HDV (>3.5t) outward movements in any one day. Moderately dusty surface material (e.g. high clay content). Unpaved road length 50 m – 100 m.	<10 HDV (>3.5t) outward movements in any one day. Surface material with low potential for dust release. Unpaved road length <50 m.

The sensitivity of the area to human health effects is assessed based on the background PM_{10} concentration at the locations of the Works, the number of receptors and their sensitivity and the distance of these receptors from the source. This is presented in Table 2.2.

Table 2.2: Human Health Receptor Sensitivity

Receptor Sensitivity	**Annual Mean PM_{10} Concentration**	**Number of Receptors**	**Distance from the Source (m)**				
			< 20	**< 50**	**< 100**	**< 200**	**<350**
High	> 32 µg/m3	> 100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32 µg/m3	> 100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 – 28 µg/m3	> 100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	< 24 µg/m3	> 100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	> 32 µg/m3	> 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32 µg/m3	> 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 – 28 µg/m3	> 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	< 24 µg/m3	> 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	> 1	Low	Low	Low	Low	Low

The people and property sensitivity of the area to dust soiling is determined from the combination of the individual receptor sensitivity (based on the number of properties) with the distance from the source activity resulting in a low, medium or high sensitivity to dust soiling. The sensitivity to dust soiling effects on ecological receptors is detailed in Table 2.3.

Table 2.3: Sensitivity of the Area to Dust Soiling Effects on Ecological Receptors

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

The area sensitivities are used in combination with the dust emission magnitude of each of the source activities to produce the risk of dust impact (Table 2.4 for earthworks and construction and Table 2.5 for trackout). The risk of dust impact is assessed separately for each part of a development for both human and property receptors and ecological receptors.

Table 2.4: Risk of Dust Impact – Earthworks and Construction

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 2.5: Risk of Dust Impact – Trackout

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

STEP 3 provides appropriate and proportionate site-specific mitigation measures. For those cases where the risk is assigned as negligible, no mitigation measures are required. It is important to note that adherence to any legislative and regulatory construction site control measures falls outside mitigation and would still be required.

STEP 4 concludes whether a development will have significant effects (defined as significant or not significant) once the risk of dust impact has been determined and mitigation measures have been applied to each of the three onsite activities. It is important to note that negligible and low risk translate to an effect that is not significant and a risk defined as medium or high will translate to a significant effect. It should be noted that the guidance states that effects would be 'not significant' in most cases, following implementation of appropriate mitigation.

2.2 Construction Phase Traffic

2.2.1 Scope of Assessment - Pollutants

Air Quality Objectives (AQOs) exist for the following pollutants[1]:

- Fine particulate matter (PM_{10} and $PM_{2.5}$);
- Nitrogen dioxide (NO_2);

[1] DEFRA (2016) National Air Quality Objectives [Online] Available at: https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf (Accessed June 2020)

- Ozone;
- Sulphur Dioxide (SO_2);
- Polyaromatic Hydrocarbons (PAHs);
- Carbon monoxide (CO);
- Benzene;
- 1,3-butadiene; and
- Lead.

These species are currently regulated because of their known or suspected deleterious effects upon human health, and because historically, relatively high concentrations have been recorded within and downwind of urban centres.

In most urban areas of the UK, traffic-generated pollutants have become the most common pollutants. These are NO2, PM10, CO, 1,3-butadiene and benzene.

This assessment of road traffic effects focuses on NO_2 and PM_{10}, as concentrations of these pollutants are least likely to meet the relevant AQO near roads.

The following traffic-generated pollutants have been excluded from the road traffic assessment, along with justification, in addition to the fact that NO_2 and PM_{10} impacts are likely to be greatest, and therefore realistic worst case:

- Lead, because it has now been removed from petrol fuels;
- SO_2, because of the introduction of low sulphur diesel and relatively insignificant sulphur content of petrol fuels; and
- CO, benzene or 1,3-butadiene, because only one of the 168 Local authorities having designated Air Quality Management Areas (AQMAs) within the UK did so due to an exceedance of CO, benzene or 1,3-butadiene objectives.

Current assessment criteria applicable to the protection of human health and Local Air Quality Management are presented in Table 2.6 below for the study species in this assessment. Concentrations are expressed in micrograms per cubic metre ($\mu g/m^3$).

Table 2.6 Pollutant AQO for the Protection of Human Health

Pollutant	**AQO**	
	Concentration	**Measured as**
Nitrogen dioxide (NO_2)	200 $\mu g/m^3$	1-hr mean not to be exceeded more than 18 times per year
	40 $\mu g/m^3$	Annual Mean
Particulates (PM_{10})	50 $\mu g/m^3$	42-hour mean not to be exceeded more than 7 times per year
	40 $\mu g/m^3$	Annual Mean

Road traffic can make substantial contributions to $PM_{2.5}$ concentrations at the kerbside (within 1 m of the kerb), but at the roadside (a few metres from the kerb) the contributions are relatively limited. Given that none of the receptors are located in very close proximity to the modelled road (the closest receptor is at least 7 m away) $PM_{2.5}$ is not assessed in this report.

2.2.2 Assessment Methodology

Construction phase traffic emissions (NO_2 and PM_{10}) were assessed as part of the 2014 ES using the DMRB screening method. Given the scale and nature of the Works, the use of the DMRB screening method is again considered acceptable for assessing the emissions of construction traffic. The pollutants originally modelled have been modelled again for the Application, using updated traffic flows and receptors.

The DMRB screening method has been used as an initial test to establish whether a more detailed assessment of traffic emissions is required. This has been used as it is consistent with the 2014 ES assessment[2]. This considers concentrations of NO_2 and PM_{10} to enable comparison with AQOs. Other pollutants have been scoped out of the assessment as detailed in Section 2.2.1. If it is predicted that the air quality criteria would be exceeded, then the DMRB advises that detailed modelling is undertaken.

The screening method takes into account the:

- Distance from receptor to centre of roads;
- Average daily vehicle flows and speeds;
- Road type (motorway or A road, other urban roads, other roads);
- Proportion of light and heavy-duty vehicles;
- Background concentrations of pollutants; and
- Predicted future traffic emissions.

In the 2014 ES, predictions were made for a baseline year of 2013, a future year of 2015 without the Works and a future year of 2015 with the Works. Air quality predictions have been made for a 2020 baseline and a 2020 with development scenario.

Paragraph 7.82 of Defra TG16[3] states that only where the DMRB assessment indicates that exceedances of the objectives are likely, or in circumstances where complex road layouts or street canyons are being assessed, then more detailed modelling is recommended.

The DMRB model requires all routes with the potential to effect a particular receptor to be modelled. Table 2.6 identifies the assessed receptors and road links, and details the distances between the receptors to each of the assessed road link(s) for that particular receptor. Figure 1 Annex A shows the location of the receptors and road links which are detailed in Table 2.7 as well as the locations of receptors used in the 2014 ES.

Table 2.7: Assessed Receptors and Links

Receptor	Distance to Centre Point of Closest Link (m)	Closest Link
1 High Street	10	B1380 (High Street)
43 Keepersgate	16	A174 (south of Wilton)
19 Chesnut Close	28	A174
Grewgrass Farm	15	Grewgrass Lane
13 Kirkwood Drive	30	A174 (south of Redcar)
Rosedene Farm	190	A1053 (Greystone Road)
524 West Dyke Road	25	A1402 (Kirkleatham Lane)
54 Larkswood Road	55	A174

[2] Whilst Highways England is updating the DMRB and has redesigned the Screening Model, it is not currently on public release. Therefore, whilst the Screening Model v1.03c, used in this assessment, has been withdrawn by the Highways Agency, it can still provide for a useful way to screen road traffic emissions to decide whether more detailed dispersion modelling needs to be undertaken, but results should be treated with caution particularly where predicted concentrations are close to the relevant Air Quality Objectives. DEFRA available online: https://laqm.defra.gov.uk/review-and-assessment/tools/modelling.html. Accessed 11/06/2020.
[3] https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf

Receptor	Distance to Centre Point of Closest Link (m)	Closest Link
27 Talisker Gardens	42	B1269 (Fishponds Road)
155 Redcar Road	8	Redcar Road

The effect on these receptors from traffic associated with the Works has been assessed. These receptors are the closest residential receptors to the modelled routes and as such they constitute realistic worst case effects. Five of the receptors have remained unchanged from the 2014 ES, however five new receptors have been included to reflect the updated routes used by construction traffic.

No ecological receptors were identified as requiring assessment. The closest ecologically designated site (Teesmouth and Cleveland Coast, Site of Special Scientific Interest (SSSI)) is located approximately 1 km to the northeast of the Works. Despite the proximity of the Teesmouth and Cleveland Coast to the Works, traffic travelling to and from the Works is likely to use routes that do not pass close to or through the designation.

The designation is located at such a distance from the Works that adverse effects arising from construction emissions associated with the Works are unlikely to effect it.

2.2.3 Assessment Criteria

The significance of any changes in pollutant concentrations in relation to traffic emissions was considered in the context of the AQO detailed in the Government's Air Quality Strategy and the Environmental Protection UK (EPUK) and IAQM guidance document 'Land-Use Planning & Development Control: Planning for Air Quality 2017[4].

Table 2.8 provides a matrix for assigning a magnitude of change for increases or decreases in the annual mean values of NO_2 and PM_{10} from negligible to substantial as published in the IAQM guidance (2017). The Air Quality Assessment Level (AQAL) can be an AQO, EU limit or target value or the Environmental Agency Environmental Assessment Level (EAL).

The *"% change in concentration relative to the AQAL"* represents the concentration contributed by a development as a percentage of the total AQAL value. This was combined with the *"long term average concentration at the receptor in an assessment year"* (annual mean concentration), which was categorised into percentage ranges of the amount it is above or below the AQAL. These parameters were combined to measure the degree of potential harm on a scale from negligible to substantial based on if the total concentration(s) of the pollutant(s) exceeds the AQAL.

Table 2.8: Assessment Matrix

Long term average Background Concentration at receptor in assessment year	**% Change in Concentration relative to AQAL**			
	<1	**2-5**	**6-10**	**>10**
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76%-94% of AQAL	Negligible	Slight	Moderate	Moderate
95%-102% of AQAL	Slight	Moderate	Moderate	Substantial

[4] Institute of Air Quality Management (IAQM)/EPUK Guidance - Land-Use Planning & Development Control: Planning for Air Quality 2017. [Online]. Available at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

103%-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

In accordance with IAQM and EPUK guidance, the above framework for describing effects has been used as a starting point to make a judgement on the level of potential effect, but the extent of effect (both geographic coverage and numbers of receptors affected) and other factors will also be considered. Professional judgement has been used to consider the overall effects, having regard to the influence and validity of assumptions adopted when undertaking the prediction of effects.

3 Baseline for Assessment

3.1 Summary of the 2014 ES Baseline

3.1.1 Background Air Quality

3.1.1.1 Local Authority Monitoring

A review of local air quality monitoring undertaken by Redcar and Cleveland Borough Council (RCBC) was undertaken as part of the 2014 ES. One automatic monitoring location was identified in Dormanstown, a Suburban Industrial Location approximately 500 m from the Works, having been relocated from a location at Corporation Road at the end of 2011. Analysis of the automatic monitoring data showed no exceedances of annual mean or short-term AQO for NO_2 and PM_{10} at either the Dormanstown or Corporation Road locations, with a maximum annual mean NO_2 concentration of 17.4 µg/m^3 and a maximum annual mean PM_{10} concentration of 20.1 µg/m^3.

NO_2 diffusion tube monitoring was not undertaken by RCBC at the time of the 2014 ES due to the relatively low traffic densities in areas of relevant public exposure.

No background monitoring locations were identified within the Study Area and therefore background pollutant concentrations were obtained from concentration maps provided by Defra for the ten 1 km grid squares covering the full extent of the Works.

3.1.1.2 Defra Background Maps

Background NOx, NO_2 and PM_{10} concentrations were identified using the Defra background maps provided on the UK-AIR, the Air Information Resource. Background concentrations were taken from each of the ten 1 km grid squares that contained the Works. Background NOx concentrations were used in the conversion of modelled NOx road vehicle contributions to NO_2. Background NO_2 and PM_{10} values were below their respective AQO at all locations within the Study Area, with the maximum background NO_2 concentration being recorded as 35.6 µg/m^3 with a maximum background PM_{10} concentration of 18.9 µg/m^3.

3.1.2 Baseline Traffic Data

Baseline and traffic flows for the 2014 ES were supplied by RHDHV. Traffic data was provided in the Traffic and Access Chapter of the 2014 ES. This information was supplied as an Annual Average Daily Traffic (AADT)

traffic flows for the year of 2015 and predicted baseline flows and flows during the construction of the 2015 DCO. The baseline traffic data used in the 2014 ES assessment is summarised in Table 3.1.

Table 3.1: Background Traffic Data Used in DMRB Model

Road	2015 without construction		2015 with construction	
	AADT	**HGVs**	**AADT**	**HGVs**
B1380 (High Street)	9,327	408	9,450	441
A174	26,245	1,479	26,450	1,600
A174 (South of Wilton)	40,540	1,400	40,929	1,641
A174 (south of Redcar)	28,173	1,541	28,312	1,585
B1269 (Fishponds Road)	5,678	212	5,710	232
Grewgrass Lane	4,345	14	4,352	18
Redcar Road	8,874	141	8,880	144
A1085 (Coast Road)	11,617	117	11,664	124
A174 (south of Redcar)	28,173	1,541	28,272	1,557
A66	29,560	2,256	29,787	2,410
Tees Dock Road	4,784	1,675	5,011	1,829

3.1.3 Baseline Air Quality

The baseline air quality was modelled using the DMRB screening assessment for each receptor in the 2013 baseline and was based on the traffic data provided in Table 3.1. The results are presented in Table 3.2.

Table 3.2: Baseline Air Quality at Receptor Locations 2013

Receptor	Annual Mean NO_2 ($\mu g/m^3$)	Annual Mean PM_{10} ($\mu g/m^3$)
	2013	**2013**
1 High Street	19.10	15.17
43 Keepersgate	17.44	13.87
19 Chesnut Close	18.09	13.47
18/19 Corncroft Mews	20.41	13.96
The Granary	13.86	14.88
Sir William Turner's Court	19.42	16.23
Grewgrass Farm	13.89	15.93
13 Kirkwood Drive	17.15	16.33
11/12 Pragnell Court	17.15	16.33
51 High Street	14.61	13.18

3.2 Review of Baseline – This Application

3.2.1 Background Air Quality

3.2.1.1 Local Authority Monitoring Data

RCBC's latest available annual air quality status report (2019)[5] provides detail on the range of monitoring undertaken by the Council in order to meet the requirements of the LAQM statutory process.

The Council operate a network of sites monitoring NO_2, and PM_{10} continuously using a combination of passive techniques (diffusion tubes) and automatic monitoring. Automatic monitoring is still only undertaken at the one location identified in the 2015 Application, however, diffusion tube monitoring is now undertaken across the Borough which was not carried out at the time of the 2014 ES.

Continuous monitoring for NO_2 only is undertaken at Dormanstown, a suburban location approximately 500 m northwest of the Works (at grid coordinates 458379, 523486). A summary of the results is given in Table 3.3.

Table 3.3: Automatic Monitoring Results

Location	**NO_2 Concentration (µg/m3)**				
	2014	**2015**	**2016**	**2017**	**2018**
Redcar Dormanstown	11	11	8.9	8.4	8.4

The monitoring data shows concentrations decreased between 2014 and 2018 and concentrations remained well below the mean annual AQO for NO_2, being less than 21% of the AQO.

The Council recently started to undertake non-automatic monitoring of NO_2 using diffusion tubes. Of these, the closest to the Works is R40 at Keilder Close (459909, 522873), a roadside site located approximately 800 m to the north of the Works. A summary of these results is given in Table 3.4.

Table 3.4: Diffusion Tube Results

Location	**NO2 Concentration (µg/m3)**				
	2014	**2015**	**2016**	**2017**	**2018**
R40	-	-	-	-	16.5

Monitoring at R40 only commenced in 2018 with a concentration well below the mean annual AQO for NO_2, being less than 42% of the AQO.

Council monitoring data is not considered representative of background concentrations of pollutants at the Works. All monitoring sites are in close proximity to traffic emissions. As traffic emissions are to be specifically modelled as part of the DMRB assessment, the monitoring locations are not representative of background concentrations at the location of the Works.

[5]RCBC (2019) Air Quality Status Report [Online] Available at: https://www.redcar-cleveland.gov.uk/resident/environmental-protection/air-quality/Documents/Air%20Quality%20Report.pdf (Accessed June 2020)

3.2.1.2 Defra Background Maps

Additional information on estimated background pollutant concentrations has been obtained from the Defra background maps provided on the UK-AIR, the Air Information Resource[6].

Estimated air pollution concentrations for NO_2 and PM_{10} have been extracted from the background pollution maps for the UK. These maps are available in 1 km x 1 km grid squares and provide an estimate of concentrations across the UK. Data has been obtained for 2020 (the base year) as an average, minimum and maximum of all the grid squares in which the Works and surrounding receptors are located, and is provided in Table 3.5.

Table 3.5: Background Pollutant Concentrations from Defra mapping

Pollutant	2020 Concentration (µg/m^3)		
	Average	**Minimum**	**Maximum**
Nitrogen dioxide (NO_2)	12.0	9.3	15.2
Particulates (PM_{10})	12.4	11.1	13.5

The data indicates that existing background concentrations in the area surrounding the Works and the surrounding receptors are well below the AQOs for NO_2 and PM_{10}.

3.2.1.3 Summary

As vehicle emissions have been explicitly modelled both the automatic monitoring station and diffusion tube locations are considered inappropriate to use as background values. This is due to their nature as suburban and roadside sites meaning that they will have already accounted for pollutant concentrations arising from vehicle emissions, and would therefore lead to double counting of emissions if used as a background to modelled traffic emissions. 2020 annual mean background concentrations, obtained from Defra background maps and presented in Table 3.5, have therefore been used in this assessment. Conservatively the assessment has used the maximum concentrations across all grid squares in which the Works and surrounding receptors are located:

- 2020 NO_2: 15.2 µg/m^3; and
- 2020 PM_{10}: 13.5 µg/m^3.

3.2.2 Baseline Traffic Data

Baseline traffic flows for the Works have been supplied by SCP Transport provided in Appendix 7 to the Environmental Appraisal. Traffic data for the Works was provided in the Transport Assessment submitted as part of the Application. This information was supplied as Annual Average Daily Traffic (AADT) traffic flows for a baseline year of 2020 and predicted flows during the construction of the Works. The Works generated traffic flows that have been reported are associated with the Application traffic but also the wider traffic flows for the 2015 DCO.

The baseline traffic data used in this assessment is summarised in Table 3.6.

[6] Defra (2018). Background mapping data for local authorities - 2017 - Defra, UK [Online] Available at: https://uk-air.defra.gov.uk/data/laqm-background-home (Accessed 28/02/2020)

Table 3.6: Background Traffic Data Used in DMRB Model

Road	Vehicle Speed (km/h)	Baseline Flows (2020)		Baseline plus Construction Traffic (2020)	
		AADT	% HGV	AADT	% HGV
A1053 (Greyston Road)	48	13,967	7.9	14,240	9.6
B1380 (High Street)	48	9,209	4.2	9,332	4.7
A174	48	31,052	5.3	31,306	6.0
A174 (South of Wilton)	48	43,340	2.5	43,822	3.1
A1042 (Kirkleatham Lane)	48	15,106	1.8	15,177	1.8
A174 (south of Redcar)	48	30,257	1.8	30,438	2.0
B1269 (Fishponds Road)	48	6,773	2.4	6,808	2.7
Grewgrass Lane	48	4,290	0.3	4,303	0.4
Redcar Road	48	8,762	1.6	8,775	1.7
A1085 (Coast Road)	48	9,178	1.1	9,242	1.2
A174 (south of Marske)	48	14,497	2.3	14,555	2.3
A174 (south of Redcar)	48	30,257	1.8	30,387	1.9

3.2.3 Baseline Air Quality

The baseline air quality has been modelled using the DMRB screening assessment, for each of the receptors in the 2020 baseline. The modelling was based on the traffic data provided in Table 3.6. The results are presented in Table 3.7.

Table 3.7: Baseline Air Quality at Receptor Locations

Receptor	Annual Mean NO_2 ($\mu g/m^3$)	Annual Mean PM_{10} ($\mu g/m^3$)
	2020	2020
1 High Street	17.1	14.1
43 Keepersgate	18.7	14.8
19 Chesnut Close	18.1	14.4
Grewgrass Farm	15.8	13.7
13 Kirkwood Drive	17.2	14.2
Rosedene Farm	15.3	13.5
524 West Dyke Road	16.9	14.2
54 Larkswood Road	16.8	14.0
27 Talisker Gardens	16.3	13.9
155 Redcar Road	16.7	14.1

The data in Table 3.7 indicates that baseline NO_2 and PM_{10} levels in 2020 are considerably below the AQOs and the levels are lower than the 2013 modelled baseline in the 2014 ES. The previous realistic worst case NO_2 concentration (at a receptor included in this assessment) was 19.10 $\mu g/m^3$ at 1 High Street; the modelled baseline in this assessment for this receptor is 17.1 $\mu g/m^3$. The previous realistic worst case PM_{10}

concentration (at a receptor included in this assessment) was 16.33 µg/m^3 at 13 Kirkwood Drive; the modelled baseline in this assessment for this receptor is 14.2 µg/m^3. Therefore, there is an improvement in the baseline air quality conditions in the vicinity of the Works.

4 Assessment of Potential Effects

4.1 Summary of 2014 ES Effects

4.1.1 Construction Phase Dust Assessment

Demolition effects were scoped out of the assessment as no demolition work was to be carried out as part of the Works. In accordance with guidance in place at the time all nearby receptors were identified as being of Medium Sensitivity.

Each source activity was given a Dust Emission Class (DEC). Construction and Trackout were of Large DEC and Earthworks were of medium DEC. Each activity was then given a risk classification: High Risk for Earthworks and Trackout and Low Risk for Construction.

The risk of the Works giving rise to dust effects was then calculated using an assessment matrix and considered before and after mitigation. The significance of the risk of giving rise to dust effects was negligible for all source activities after appropriate mitigation, and was described overall as negligible.

4.1.2 Construction Phase Traffic Assessment

Predictions of traffic emissions arising as a result of construction traffic associated with the Works were made using the Design Manual for Roads and Bridges (DMRB) screening tool.

The assessment considered the section of the road network most likely to experience the highest increase in traffic volume as a consequence of the Works, as set out in the associated Transport Assessment and uses the traffic numbers summarised in Table 3.1. Resulting concentrations were predicted at 10 receptors as summarised in Table 3.7 and the effects of construction vehicles on local air quality at the identified receptors was identified as negligible.

4.2 Effects arising from this Application

4.2.1 Construction Phase Dust Assessment

4.2.1.1 Dust Emission Magnitude

Demolition

There are no buildings to be demolished as part of the Works. Demolition effects are therefore excluded from the scope of the assessment.

Earthworks

The gross area of the Works is larger than 10,000 m^2 and is likely to involve more than 10 heavy earth moving vehicles at any time.

The BGS geological mapping and online Geo-Index[7] suggests that superficial deposits at the location of the Works consist of Diamicton Till. The BGS (Solid and Drift) geology map illustrates underlying bedrock to be Mudstone, Siltstone, Limestone and Sandstone of the Lias Group.

It is considered that when dry, this material has the potential to be dusty. Given this, along with the scale of the Works and number of heavy vehicle movements, the dust emission magnitude for earthworks is considered to be large.

Construction

Construction will involve a total building volume of greater than 100,000 m^3. Although no onsite sand blasting or concrete batching is anticipated, due to the size of the Works, the dust emission magnitude for construction is considered to be large.

Trackout

The number of heavy-duty vehicles accessing the Works, which may track out dust and dirt, is currently expected to be greater than 50 per day. Although the length of any unpaved road as a result of the Works would be short, less than 50 m, due to the number of vehicle movements, and the potentially dusty surface material, the dust emission magnitude for trackout is considered to be large.

Summary

Table 4.1: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction	Large
Trackout	Large

4.2.1.2 Sensitivity

Effects from Dust Soiling

The IAQM guidance states that residential properties are 'high' sensitivity receptors to dust soiling. The Works are located in areas adjacent to residential properties, with more than 100 properties in close proximity of the Works, i.e. within 350 m. However, this only affects the easternmost of the five aeas that comprise the Works, where the closest properties are located approximately 270 m from the Works. Given the presence of residential properties and their proximity, the area surrounding the Works site is of low sensitivity to dust soiling from onsite works.

The dust emission magnitude for trackout is large and there is potential for material to be tracked away from the site entrance. Construction vehicles will likely access the Works via a number of routes, along which there

[7] BGS (2020) Geology of Britain viewer | British Geological Survey (BGS) [Online] Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html (Accessed: 24/05/2020)

are more than 100 residential properties within 50 m of these routes, within 500 m of the entrances to these works areas, and these may be affected by trackout. The area surrounding the Works is of high sensitivity to dust soiling from trackout.

Human Health Effects

Residential properties are classified as being of 'high' sensitivity to human health effects. The 2020 baseline PM_{10} concentration is 12.4 µg/m^3. Using the matrix in the IAQM guidance, the areas surrounding the Five Areas are of **low** sensitivity to human health effects from onsite works given the background concentration and lack of receptors within 20 m. The area surrounding roads along which material may be tracked is of medium sensitivity from trackout given there are more than 100 receptors within 20 m of the roads (within 500 m of the Works entrances).

Ecological Effects

There are no designated ecological sites within 50 m of any of the Five Areas or within 50 m of the roads along which material may be tracked within 500 m of the entrances. Dust effects on ecological receptors are therefore not considered any further in the assessment.

Summary

Table 4.2 summarises the dust emissions sensitivity of the area surrounding the Works.

Table 4.2: Summary of Dust Emission Sensitivity

Dust Effect	**Sensitivity of Surrounding Area**	
	Onsite Works	**Trackout**
Dust Soiling	Low	High
Human Health	Low	Medium
Ecological	N/A	N/A

4.2.1.3 Summary

A risk category for each activity is a combination of dust emission magnitude and environmental sensitivity. Table 4.3 provides a summary of risk impact (without mitigation).

Table 4.3: Summary of Dust Risk Impact

Source	**Dust Soiling**	**Human Health**
Earthworks	Low (Onsite works)	Low (Onsite works)
Construction	Low (Onsite works)	Low (Onsite works)
Trackout	High	Medium

The IAQM guidance is clear, as was the case for the guidance used in the 2014 ES, that with appropriate mitigation in place the residual effect will normally be 'not significant'. The mitigation measures already proposed are based on the IAQM guidance and are deemed to be appropriate to the scale of the risk as assessed; with these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

However, the IAQM guidance acknowledges that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, particularly under adverse weather conditions. During these events, short-term dust annoyance may occur. However, the scale of this would not normally be considered sufficient to change the conclusion that overall effects will be 'not significant'.

This constitutes no change from the findings of the 2014 ES with regards to the potential impact of construction phase dust emissions.

4.2.2 Construction Phase Traffic Assessment

This assessment considers the section of the road network most likely to experience the highest increase in traffic volume as a consequence of the Works, as set out in the Transport Assessment and uses the traffic numbers summarised in Table 4.4. The results of the DMRB assessment are presented in Table 4.4 and are provided as '2020 Baseline' and '2020 with the Works' traffic scenarios.

Table 4.4: 2020 Baseline and '2020 With Development' Air Quality at Receptor Locations

Receptor	Annual Mean NO_2 (µg/m^3)	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Annual Mean PM_{10} (µg/m^3)
	Baseline	With the Works	Baseline	With the Works
1 High Street	17.1	17.2	14.1	14.2
43 Keepersgate	18.7	18.9	14.8	14.8
19 Chesnut Close	18.1	18.2	14.4	14.4
Grewgrass Farm	15.8	15.8	13.7	13.7
13 Kirkwood Drive	17.2	17.2	14.2	14.3
Rosedene Farm	15.3	15.3	13.5	13.5
524 West Dyke Road	16.9	16.9	14.2	14.2
54 Larkswood Road	16.8	16.8	14.0	14.0
27 Talisker Gardens	16.3	16.3	13.9	13.9
155 Redcar Road	16.7	16.7	14.1	14.1

As shown in Table 4.4, no exceedances of the annual mean NO_2 and PM_{10} AQOs are predicted at any identified receptor. The additional traffic generated by the Works is predicted to lead to an addition of at most 0.2 µg/m^3 to the annual mean NO_2 concentration (43 Keepersgate), which equates to 0.5% of the AQO. There is only an increase in NO_2 concentration at 2 further receptors (0.1 µg/m^3) with 7 of the receptors not being subject to any change with the Works. This is considered to be a negligible impact, being 0.5% of the long-term AQO. The maximum NO_2 concentration modelled with the Works traffic was 18.7 µg/m^3, which is 46.8% of the long-term AQO.

The additional traffic generated by the Works above the 2020 Baseline scenario is predicted to lead to an addition of 0.1 µg/m^3 to the annual mean PM_{10} concentration at 1 High Street and 13 Kirkwood Drive, which equates to 0.25% of the AQO. There is no change in concentration at all other 8 receptors when the Works traffic is added to the 2020 baseline. This is considered to be a negligible impact, being 0.25% of the long-term AQO. The maximum PM_{10} concentration modelled was 14.8 µg/m^3 at 43 Keepersgate, which is 37% of the long-term AQO.

For comparison the closest receptor to diffusion tube R40 is 524 West Dyke Road where the 2020 modelled concentration was 16.9 µg/m^3 compared to a 2018 monitored concentration of 16.5 µg/m^3 at R40. This suggests a close correlation between the model and background monitoring. It's likely in reality that the modelled results in this report are an over prediction given an anticipated reduction in background concentration between 2018 and 2020 and that the maximum background concentration for all of the 1 km grid squares covered by the Works site has been used. Given the close correlation with monitored background concentrations, and the overall low modelled concentrations which are substantially below the AQOs, the use of the DMRB screening tool is deemed acceptable.

The air quality effects arising as a result of traffic emissions associated with the Works will therefore be negligible (and not significant) at existing residential receptors and not require further detailed modelling or assessment. This represents no change from the findings of the 2014 ES with regards to traffic emissions from the Works.