Southampton to London Pipeline Project

Volume 6

Environmental Statement (Volume D)
Appendix 13.2: Air Quality Technical Note

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Contents

Appendix 13.2 Air Quality Technical Note

1.1 Introduction

1.1.1 The term 'air quality' refers to levels of air pollution that could potentially affect health, such as emissions of air pollutants from car exhausts and other sources such as generators. It also refers to dust, which could affect health or give rise to annoyance due to the soiling of surfaces through deposition. Both air pollution and dust could also affect fauna and flora.

1.1.2 This appendix considers the potential emission sources of air pollutants and dust associated with the project, as set out below:

- emissions of pollutants from construction-related road vehicles travelling on the local road network; and
- dust emissions generated by construction activities, including set up of the logistics hubs, earthworks, trench excavation and material storage (described in Chapter 3 Project Description).

1.1.3 This appendix also includes a summary of the carbon assessment as part of the consideration of effects on climate change. The description of how the project is resilient to climate change is covered within Chapter 3 Project Description.

Legislative and Policy Background

1.1.4 Chapter 2 Regulatory and Policy Context sets out the overarching policy relevant to the project including the Overarching National Policy Statement for Energy (EN-1). EN-1 contains the following paragraphs relating to air quality and climate which have been considered within this appendix.

1.1.5 Paragraphs 5.2.6 - 7 state '*Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES). The ES should describe:*

- *any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;*
- *the predicted absolute emission levels of the proposed project, after mitigation methods have been applied;*
- *existing air quality levels and the relative change in air quality from existing levels; and*
- *any potential eutrophication impacts*.'

1.1.6 Paragraphs 5.6.4-5 state '*The applicant should assess the potential for insect infestation and emissions of odour, dust, steam, smoke and artificial light to have a detrimental impact on amenity, as part of the ES. In particular, the assessment provided by the applicant should describe:*

- *the type, quantity and timing of emissions;*

- *aspects of the development which may give rise to emissions;*
- *premises or locations that may be affected by the emissions;*
- *effects of the emission on identified premises or locations; and*
- *measures to be employed in preventing or mitigating the emissions'*.

1.1.7 In addition, Appendix 2.1 Environmental Legislation and Policy includes legislation and national policy relevant to air quality and climate. Appendix 2.2 Regional and Local Planning Policy provides a review of local policy considerations relevant to air quality and climate.

1.2 Approach and Methods

Scope of the Assessment

1.2.1 The scope of the air quality assessment has been informed by the Scoping Opinion, provided by the Planning Inspectorate in September 2018, on behalf of the Secretary of State, following the submission of the Scoping Report (Esso, 2018).

1.2.2 Table 1.1 summarises the scope of the assessment for air quality and climate. This table includes the references (for example ID 4.6.1) to the relevant paragraph response from the Planning Inspectorate in the Scoping Opinion. The boxes shaded in grey are the matters that have been scoped out of the assessment following the feedback from the Planning Inspectorate.

1.2.3 The Planning Inspectorate confirmed that emissions from construction plant and machinery, and air quality effects associated with the operation of the pipeline could be scoped out of the ES on the basis of the low likelihood of significant effects. These are not considered further within this technical note.

Table 1.1: Matters Scoped In and Out of the Assessment (Grey Shading Indicates Matters Scoped Out Following Feedback from the Planning Inspectorate)

Receptor	Matter/Potential Effect	Conclusion in the Scoping Report (July 2018)	Comments from the Planning Inspectorate in the Scoping Opinion (September 2018)
Air quality	Construction dust (rural and urban)	Scoped out	(ID 4.11.3) The Scoping Report currently does not provide detailed information regarding the location and value of sensitive receptors that could be within or adjacent to the route and could potentially be affected by dust deposition, nor does it entirely confirm the risk from construction generated dust associated with the project. The ES should clearly identify the risk of construction dust and the sensitivity of receptors for the project, where significant effects are likely. The ES should describe any proposed mitigation relied upon and the anticipated efficacy of the mitigation, before concluding on residual effects. Scoped in.
	Emissions from construction plant	Scoped out	(ID 4.11.4) The Inspectorate agrees that this matter can be scoped out of the impact assessment within the ES. **Scoped out**.

Receptor	Matter/Potential Effect	Conclusion in the Scoping Report (July 2018)	Comments from the Planning Inspectorate in the Scoping Opinion (September 2018)
	and machinery (rural and urban)		
	Emissions from construction-related road traffic (rural and urban)	Scoped out	(ID 4.11.5) Due to lack of clarity with regards to the data and the lack of information on the anticipated traffic flows and locations, displaced traffic effects, and cumulative effects, the Inspectorate considers that the ES should confirm the anticipated construction vehicle movements and present an assessment of air quality effects from increased construction vehicle movements on sensitive receptors (human and ecological), where significant effects are likely to occur. Scoped in.
	Emissions from the operation of the pipeline	Scoped out	(ID 4.11.6) The Inspectorate agrees that emissions from the operation of the pipeline can be scoped out of the impact assessment within the ES. **Scoped out**.
Climate change	Climate (greenhouse gas emissions)	Scoped in	(ID 3.3.16) The ES should include a description and assessment of the likely significant effects on climate (for example having regard to the nature and magnitude of greenhouse gas emissions). Scoped in.

Study Area

1.2.4 There are a number of different types of potential air quality effects or emission sources that require assessment, as well as different locations to consider. As a result, the air quality study area cannot be defined within a fixed boundary for all activities, but necessarily varies between the different activities.

1.2.5 For dust emissions during the construction phase, the assessment of human receptors focuses on areas extending up to 350m from the Order Limits. This distance is based on the Institute of Air Quality Management (IAQM) guidance for identifying when an assessment of dust effect is required (IAQM, 2016). Any good practice measures applied to protect sensitive receptors within 350m would help to reduce any possible effects beyond 350m. The effects of construction-related vehicles moving on and around the construction area emitting exhaust particulate matter and re-suspending loose material on the road, referred to as "*trackout*", also need to be determined up to 50m from the edge of the local access roads within 50m of the site access points. The assessment also considers ecological receptors up to 50m from the Order Limits.

1.2.6 The identification of a study area for emissions from road traffic would normally be based on receptors located within 200m of road links that exceed the Land Use Planning and Development Control: Planning for Air Quality guidance (IAQM/ Environmental Protection UK (EPUK), 2017) screening criteria, which are set out in Section 3. As described in Section 6, no links have been identified where the project would generate traffic flows that exceed these criteria. Therefore, it was not necessary to define a specific study area for the assessment of emissions from road traffic.

1.2.7 For the purposes of this assessment, the route and Order Limits are broken down into eight separate sections, further details can be found in Chapter 3 Project Description:

- Section A – Boorley Green to Bramdean;
- Section B – Bramdean to South of Alton;
- Section C – South of Alton to Crondall (via Alton pumping station);
- Section D – Crondall to Farnborough (A327 crossing);
- Section E – Farnborough (A327 crossing) to Bisley and Pirbright Ranges;
- Section F – Bisley and Pirbright Ranges to M25;
- Section G – M25 to M3; and
- Section H – M3 to the West London Terminal storage facility.

Limitations

1.2.8 A series of assumptions have been made for the purpose of the assessment of dust from activities associated with the construction of the project.

- Where information needed for the assessment of dust from demolition and construction activities was not available, a conservative assumption was made to provide a more robust approach to the assessment.
- The IAQM guidance (IAQM, 2016) recommends that the proposed good practice ensures that any potential significant adverse effects would not occur so that the residual effects can be considered as 'not significant'. However, the IAQM guidance suggests that, even with a rigorous management plan in place (including standard good practice), it is not possible to guarantee that the good practice measures would be effective continuously. For example, if dust emissions occur under adverse weather conditions due to the failure of a dust-control measure, local receptors may experience infrequent, short term dust annoyance.

1.3 Methodology

Dust During the Construction Phase

1.3.1 The assessment of dust during the construction phase has been carried out using a risk-based appraisal. This takes into account the location of nearby sensitive receptors in relation to the project and the planned type and scale of the construction-related activities. The assessment follows the process set out in the IAQM guidance (IAQM, 2016), which is a widely used and accepted approach to determine the risk.

1.3.2 Some construction phase activities associated with the project have the potential to generate fugitive dust emissions. These may cause annoyance due to the soiling of surfaces, risk of health effects due to the increase in exposure to fine particulates such as PM_{10} and $PM_{2.5}$ and damage to vegetation and ecosystems (where very high levels of dust soiling occur).

1.3.3 The screening distances to identify where there is a need to consider construction dust are set out within the IAQM guidance (IAQM, 2016) as follows:

- the presence of human receptors within 350m of the Order Limits and/or within 50m of the public highway that are used as access routes by construction vehicles within 50m from site access points; and
- the presence of ecological receptors within 50m of the Order Limits and within 50m of the public highway that are used as access routes by construction vehicles within 50m from site access points.

1.3.4 Human receptors comprise residential dwellings, schools, hospitals, recreational areas or other air quality sensitive locations such as footpaths and gardens or areas where members of the public have access.

1.3.5 The dust assessment assigns a risk classification for each of the four activity types (demolition, earthworks, construction (including pipeline installation and set-up of the construction logistics hubs) and trackout). This risk classification is then used to recommended site-specific good practice measures to reduce the residual effects of dust emissions to be not significant. In line with the IAQM guidance (IAQM, 2016), the significance of effects is only assigned to the dust emissions of the pipeline installation activities with the implementation of the recommended good practice measures in place.

1.3.6 A detailed description of the methodology is set out within the IAQM guidance (IAQM, 2016) and is not repeated in this document.

Emissions from Construction-Related Road Traffic

1.3.7 Engine exhaust emissions from heavy-duty vehicles (HDVs) and light-duty vehicles (LDVs) associated with pipeline installation activities have the potential to affect local air quality.

1.3.8 The Land Use Planning and Development Control: Planning for Air Quality guidance (IAQM/EPUK, 2017) sets out the following screening criteria for deciding when an air quality assessment is required:

- the change in HDV flows is greater than 25 annual average daily traffic (AADT) within or adjacent to an air quality management area (AQMA) or greater than 100 AADT elsewhere; and
- the change in LDV flows is greater than 100 AADT within or adjacent to an AQMA or greater than 500 AADT elsewhere.

1.3.9 Road links that experience a change in traffic flows below these thresholds do not require further assessment, as the change in concentrations of pollutants at receptors close to these roads would be imperceptible. Should road links exceed these thresholds, then a detailed assessment would be required.

Carbon Emissions

1.3.10 An estimate of carbon has been calculated. This addresses the Scoping Opinion request from the Planning Inspectorate (see Table 1.1) to include consideration of the nature and magnitude of greenhouse gas emissions.

1.3.11 The assessment has used the Department for Business, Energy & Industrial Strategy (BEIS) conversion factors to estimate the carbon expected from the project (BEIS, 2018b). The construction phase calculations included the main materials that would be used in constructing the project and the carbon generated from emissions associated with construction vehicles and plant. The operational phase calculations included estimates for pumping the fuel and energy associated with lighting and emissions from inspection vehicles.

1.4 Baseline Conditions

Air Quality

1.4.1 The Order Limits pass through eight district/borough local authorities plus South Downs National Park. Of these, Surrey Heath Borough Council (SHDC), Runnymede Borough Council (RBC) and Spelthorne Borough Council (SBC) have declared AQMAs that the Order Limits pass through or are near to, these are summarised below.

- The SHDC AQMA is within 350m of the Order Limits. It was declared due to predicted exceedances of the annual mean nitrogen dioxide (NO_2) and 24-hour mean PM_{10} (particulate matter with an aerodynamic diameter of 10 microns or less) Air Quality Objectives (AQOs).
- The Order Limits pass through the RBC AQMA along the M25 motorway. This is declared due to predicted exceedances of the annual mean NO_2 and 24-hour mean PM_{10} AQOs.
- The Order Limits pass through the Spelthorne AQMA, which encompasses the whole borough. This AQMA has been declared due to predicted exceedances of the annual mean NO_2 AQO.

1.4.2 Within the SHDC and RBC AQMAs the concentrations of the declared pollutants are expected to be close to, or exceeding the relevant AQOs. As the whole of Spelthorne Borough has been declared as an AQMA it is likely that only parts of the borough actually exceed the relevant AQOs. At all other locations, where AQMAs have not been declared, the air would be expected to be of better quality and the AQOs would not be exceeded or be close to being exceeded.

1.4.3 The Department of Environment, Food and Rural Affairs (Defra) background maps (Defra, 2018a) were used to provide typical background concentrations at the closest 1km x 1km grid squares encompassing the proposed route. The maximum annual mean NOx (oxides of nitrogen), NO_2 and PM_{10} concentrations for the grid squares within 400m of the Order Limits for each section are shown in Table 1.2.

Table 1.2: Summary of Background Map Pollutant Concentrations

Proposed Route Section	Annual Mean Concentration (µg/m^3)			
	NOx	NO_2	PM_{10}	$PM_{2.5}$
Air Quality Objective	*30*	*40*	*40*	*25*
Section A – Boorley Green to Bramdean	16.88	12.41	13.16	8.61
Section B – Bramdean to South of Alton; A31 Ropley Dean and A31/A32 construction logistics hubs	9.90	7.60	13.59	8.57
Section C – South of Alton to Crondall	11.18	8.53	13.55	8.67
Section D – Crondall to Farnborough (A327 crossing) and Hartland Park Village construction logistics hub	12.69	9.58	12.13	8.18
Section E – Farnborough (A327 crossing) to Bisley and Pirbright Ranges and MoD Deepcut construction logistics hub	26.40	18.69	15.08	9.92
Section F – Bisley and Pirbright Ranges to M25 and New Road Windlesham construction logistics hub	22.30	16.10	13.48	8.91
Section G – M25 to M3	33.93	23.44	15.83	10.23
Section H – M3 to the West London Terminal storage facility and Brett Aggregates construction logistics hub	31.27	21.17	14.42	9.45

1.4.4 The information in Table 1.2 shows the background map concentrations, which would represent the concentrations away from specific/major air pollution sources and more akin to the rural or urban background. This shows that the existing air quality concentrations in the vicinity of the Order Limits generally comply with the relevant AQOs.

1.4.5 A list of ecological receptors (comprising Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), Local Nature Reserves, non-statutory designated sites and Ancient Woodland) within 1 km of the Order Limits are presented in Chapter 7 Biodiversity. The ecological receptors included within this assessment are provided in Section 1.6.

Carbon Emissions

1.4.6 The Climate Change Act 2008 set in law a long-term target to reduce the UK's emissions to 80% below 1990 levels by 2050, and established the system of UK carbon budgets. To meet these targets, the government has set five-yearly carbon budgets which currently run until 2032. They restrict the amount of greenhouse gas the UK can legally emit in a five year period. The UK is currently in the third carbon budget period (2018 to 2022) with a target to reduce carbon by 37% below 1990 levels. The fourth carbon budget (2023 to 2027) has a target to reduce carbon by 51% below 1990 levels (Committee on Climate Change, 2019). The UK emitted 460.2 million tonnes of carbon dioxide equivalent in 2017 (as published by the BEIS).

1.5 Design Basis and Assumptions

1.5.1 This section sets out the design basis for the assessment of effects. It sets out where any assumptions have been made to enable the assessment to be carried out. All commitments are listed within the Register of Environmental Actions and Commitments (REAC), which is included within Chapter 16 Environmental

Management and Mitigation. Commitments include embedded design measures, good practice measures and mitigation required to reduce potentially significant effects.

1.5.2 This appendix contains a number of project commitments to reduce impacts on the environment. These are indicated by a reference number like this (G20). Good practice measures are set out in the REAC and secured through Development Consent Order (DCO) requirements such as the Code of Construction Practice (CoCP) (Appendix 16.1).

Dust During the Construction Phase

1.5.3 The assessment was undertaken on the basis that all activities, as categorised within the IAQM guidance (IAQM, 2016) (i.e. demolition, earthworks, construction and trackout), take place at the site boundary (which is represented by the Order Limits). This represents a conservative assumption as, in practice, most activities would not take place at the site boundary, increasing the distance between the source and the receptor. A description of the activities undertaken within the Order Limits relevant to this assessment is set out below.

1.5.4 The activities associated with the construction phase including the pipeline installation and construction logistics hubs are described in detail in Chapter 3 Project Description. The key potential dust emission sources associated with these activities are summarised within this section. Where possible, these have been designated within the four categories used for the IAQM dust assessment method of demolition, earthworks, construction and trackout. These are described below.

Demolition

1.5.5 The only demolition activities anticipated during construction are the dismantling of a row of nine garages on Stake Lane in Farnborough. The volume of these garages is very small, likely to be less than 400m^3. It is also possible that removal of garden sheds/greenhouses may be required. The dismantling would have limited dust-generating potential and therefore these activities are not considered further in this assessment.

Earthworks

1.5.6 Earthworks activities include topsoil stripping (where required) and the excavation of trenches (utilising an open cut method) to install the pipeline. The material excavated during the digging of the trenches would be placed in stockpiles along the whole route. Topsoil and subsoil intended for reinstatement would be temporarily stockpiled as close to where they were stripped as practicable, (G155) unless the working width is reduced to such an extent that the topsoil would need to be stored at an alternative location close by.

1.5.7 The replacement pipeline would be buried underground for its entire length. The minimum depth from the top of the pipe to the ground surface would be 1.2m in open cut sections, and deeper for trenchless crossings. The pipeline would also be buried deeper, typically 1.5m from top of pipe to ground surface, in roads and streets to account for other existing infrastructure such as utility pipes, cables and sewers.

1.5.8 Open cut methods would be used for the majority of the route. For crossings of A-roads and motorways (including the M25 and M3) and other heavily trafficked roads, railways (including main and branch lines) and some watercourses (including the River Thames), specialist trenchless techniques would be used.

1.5.9 Where the main method of construction is open cut and this is in a flat open landscape with no constraints, the average rate of pipeline laying is assumed to be 450m per week for trench excavation, pipe installation and backfilling of trenches. Prior to this the contractor would fence the site, strip topsoil and undertake any other pre-installation set up. At this rate of work, a 1km stretch of pipeline could be installed and covered in just over two weeks. Where a different methodology is assumed, for example trenchless crossings, narrow working or street working, the average rate of pipeline laying would take longer.

1.5.10 For the six construction logistics hubs, where applicable the topsoil would be stripped from the logistics area and stockpiled around the hub perimeter within the site fence. A stone road and apron would be laid on a geotextile membrane to provide an all-weather surface access to the local highway.

1.5.11 Approximately 52 temporary compounds would be established along the route of the new pipeline for the storage of pipe, materials, plant and equipment. Construction compound sizes would vary but would have a fenced area of approximately 40m x 60m for a typical rural construction compound.

Construction

1.5.12 The main construction activities associated with the project include the installation of the pipeline and the construction of up to six construction logistics hubs. The logistics hubs would serve as strategic points for accepting deliveries and storage of materials to help reduce the effects on the local road network and communities. The construction logistics hubs would vary in size and shape depending on the location, and would be established before commencement of the pipeline installation works. Each of the hubs would comprise a pipe laydown area, secure plant storage area, bunded fuel storage, single-storey offices, staff welfare facilities and a vehicle parking area.

Trackout

1.5.13 Construction vehicles would emit exhaust particulate matter and re-suspend loose material on the surface. Material tracked out to the local road network on the wheels of site traffic could be re-suspended by passing traffic.

Good Practice Measures

1.5.14 The assessment process has identified the good practice measures which would be required to control the effects of dust emissions during construction. The project has included good practice measures within the REAC, based on those recommended by the IAQM guidance (IAQM, 2016), which would be secured through DCO requirements such as the CoCP. Table 1.3 sets out a summary of the key measures relating to air quality. The following assessment is based on these good practice measures being in place.

Table 1.3: Good Practice Commitments Within the REAC

Ref	Commitment Description
G9	A central Environmental Log would be set up. The Log would be available to view by the local authority if requested. It would be a living document and be kept up to date and referred to on a regular basis. This would have three main purposes: • to record all comments and complaints made to the site together with resulting actions and outcomes; • to record where and when environmental monitoring takes place and what if any action is required and when it has been completed; and • to record the results of site inspections and note the measures taken where required.
G11	Runoff across the site would be controlled by the use of a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding.
G14	An appropriate speed limit would be imposed on vehicles travelling on site.
G15	Wheel washing would be provided at all logistics hubs and large compound access points on to the highway. An adequate supply of water would be made available at these locations at all times.
G16	Compound access points to the public highway would be constructed with temporary hard surfacing.
G17	Materials and equipment would not be moved or handled unnecessarily.
G18	Bonfires and the burning of waste material would be prohibited.
G19	When loading and unloading materials from vehicles, including pipes and excavated materials, drop heights would be limited.
G20	Water assisted road cleaners would be deployed on public roads where necessary to prevent excessive dust or mud deposits.
G21	Vehicle loads would be sheeted during the transportation of loose, potentially dusty or contaminated excavation material.
G23	All plant and vehicles would be required to switch off their engines when not in use and when it is safe to do so.
G24	In the absence of a mains electricity supply, super silent pack generators would be used as an alternative power supply.
G25	Any activity carried out or equipment located within a logistics hub or construction compound that may produce a noticeable nuisance from dust, noise, lighting etc would be located away from sensitive receptors such as residential properties or ecological sites where practicable.
G27	The name and contact details for the project would be displayed at the entrance to all compounds. This would include an emergency number.
G28	Construction workers would undergo training to increase their awareness of environmental issues. Topics would include but not be limited to: • dust management and control measures; • location and protection of sensitive environmental sites and features; • adherence to environmental buffer zones; • noise reduction measures; • working with potentially contaminated materials; • flood risk response actions; and • agreed traffic routes, access points etc.

Ref	Commitment Description
G30	A dust management plan would be produced, including the following measures to be implemented where relevant: • control runoff of water or mud to reduce the spread of particulates that could subsequently be disturbed and become airborne; • return subsoil and topsoil at the earliest suitable time of year after construction has been completed; • manage earthworks and soil by methods such as covering, seeding or using water suppression where appropriate; • limit de-compaction of the subsoil in windy conditions during reinstatement; • construct compound access points to the public highway with temporary hard surfacing; • enforce an appropriate speed limit for vehicles travelling on site to limit dust generation; • make an adequate water supply available for effective dust/particulate matter suppression/mitigation; • protect sand and other aggregates from drying out. • limit drop heights when loading and unloading materials from vehicles including pipes and excavated materials; • control the number of handling operations to ensure that dusty material is not moved or handled unnecessarily; • where there is a risk of dust nuisance when using cutting, grinding or sawing equipment, use in conjunction with suitable dust suppression techniques; • keep equipment readily available to clean any dry spillages; • clean up spillages as soon as reasonably practicable after the event using wet cleaning methods; • limit dry sweeping of large areas; • prohibit bonfires or the burning of waste materials; • provide adequate wheel washing facilities at all logistics hubs and large compound access points on to the highway; • deploy water assisted road cleaners on public roads when necessary to prevent excessive dust or mud deposits; • sheet vehicle loads during the transportation of loose or potentially dusty material or contaminated excavation material; spoil; and • undertake inspections to monitor dust and record results in the Environmental log. The frequency of inspections to be increased when activities with a high potential to cause nuisance are being carried out, or conditions increase the risk of nuisance, e.g. windy conditions increase dust risk.

Emissions from Construction Related Road Traffic

1.5.15 The highest increase in vehicle numbers during the construction phase would occur on road links around the construction logistics hubs where construction traffic would be greatest in order to access the specific logistics hub entrances.

1.5.16 Based on information provided in Appendix 13.1 Traffic and Transport Technical Note, the expected greatest number of construction traffic movements, including construction workers and staff, occurs at the Hartland Park construction logistics hub. There is predicted to be a total of 44 HDV movements (i.e. 22 in and 22 out) and 258 LDV movements (i.e. 129 in and 129 out) (presented as a peak year AADT).

1.5.17 At the Brett Aggregates construction logistics hub, which is located within an AQMA, based on information provided in Appendix 13.1 Traffic and Transport Technical Note, there is predicted to be a total of 20 HDV movements (i.e. 10 in and 10 out) and 140 LDV movements (i.e. 70 in and 70 out) (presented as a peak year AADT).

As described in the Transport Assessment (**application document 7.4**), some of the LDVs would not use the public roads as they would travel along the haul road to their intended destination. In addition, there are two points of access, Littleton Lane and Shepperton Lane. The number of vehicles accessing the site would be split between those accessing to/from the north on Littleton Lane and those accessing it to/from the south on Littleton Lane. The same principle would apply to the distribution on Shepperton Lane. Therefore, it is likely that, at any location on Littleton Lane and Shepperton Lane, the increase in LDV movements would be less than 100.

Carbon Emissions

1.5.18 Estimates have been made of materials, construction plant and vehicle numbers during construction. The operational effects have been estimated using estimated energy consumption from pumping operations and lighting; and fuel consumption associated with pipeline inspection activities.

1.6 Potential Impacts (Without Mitigation)

Dust During the Construction Phase

Step 1: Identify the Need for a Detailed Assessment

1.6.1 There are sensitive human receptors within 350m of the Order Limits. In addition, parts of the Order Limits pass within 50m of ecological receptors with designations including SSSI, SAC and SPA. Therefore, there would be a risk of dust impacts on human and ecological receptors and further assessment is required.

1.6.2 A count of the sensitive relevant human receptors within the specified assessment bands (i.e. up to 20m, 50m, 100m and 350m from the Order Limits) was carried out as recommended in IAQM guidance (IAQM, 2016). The 'high' sensitivity receptor counts are set out in Table 1.4 for the sections and in Table 1.5 for the construction logistics hubs.

1.6.3 As set out in Table 1.7, all eight sections and construction logistics hubs have a small emission magnitude for trackout. Therefore, the IAQM guidance (IAQM, 2016) recommends a trackout count be undertaken for receptors within 50m of the route(s) used by construction vehicles on the public highway, up to 50m from the site access points. Site access/egress points and haul routes are still to be finalised. However, an approximate count of high sensitivity receptors (e.g. residential properties) up to 50m from the likely site entrance(s) has been undertaken. These receptors are also set out in Table 1.4 and Table 1.5.

Table 1.4: Dust Soiling and Human Health High Sensitivity Receptor Count – Proposed Route

Construction Activity and Distance		High Sensitivity Receptor Count for the Proposed Route Sections							
		A	B	C	D	E	F	G	H
Demolition, Earthworks and Construction									
	<20m	5	5	5	45	258	38	57	281
	<50m	29	16	14	165	730	217	151	677

Construction Activity and Distance		High Sensitivity Receptor Count for the Proposed Route Sections							
		A	B	C	D	E	F	G	H
Distance to construction boundary	<100m	52	33	33	353	1,748	648	474	1,459
	<350m	409	176	371	1,694	8,022	3,166	2,656	5,500
Trackout									
Distance from roads up to 50m from the site entrance	<20m	1-10	1-10	1-10	10-100	10-100	10-100	10-100	10-100
	<50m	10-100	10-100	10-100	10-100	10-100	10-100	10-100	10-100

Table 1.5: Dust Soiling and Human Health High Sensitivity Receptor Count – Construction Logistics Hubs

Construction Activity and Distance		High Sensitivity Receptor Count for the Construction Logistics Hubs					
		A31 Ropley Dean	MOD Deepcut	Hartland Park Village[1]	New Road Windlesham	Brett Aggregates Yard	A31/A32
Demolition, Earthworks and Construction							
Distance to construction boundary	<20m	0	0	0	0	0	0
	<50m	0	0	0	0	0	0
	<100m	0	27	0	0	0	5
	<350m	11	373	0	26	3	28
Trackout							
Distance from roads up to 50m from the site entrance	<20m	1-10	1-10	0	0	0	0
	<50m	1-10	1-10	0	1-10	1-10	0

Note 1: There are no high sensitivity receptors within 350m of the Hartland Park Village Order Limits. However, Hartland Park Village has been included in the assessment as there is a low sensitivity receptor (i.e. a Public Right of Way) within 350m of the Order Limit.

1.6.4 There are a total of 737 medium sensitivity human receptors (e.g. commercial premises, petrol station and playgrounds) and 977 low sensitivity human receptors (e.g. Public Rights of Way and cycle-paths) within 350m of the Order Limits. There are approximately 55 medium sensitivity human receptors and approximately 65 low sensitivity human receptors within 350m of the construction logistics hubs.

1.6.5 This assessment is based on the high sensitivity human receptors as presented in Table 1.4 and Table 1.5, which represents the worst-case approach. The exception is Hartland Park Village, which is based on the low sensitivity human receptor as there are no high sensitivity receptors within 350m of the site. Any good practice measures recommended from this assessment based on the high sensitivity receptors, would also be suitable for reducing effects at the medium and low sensitivity receptors.

1.6.6 The effect of dust during the construction phase on ecological sites has also been considered. The ecological receptors include designated ecological sites, SSSIs, SACs, SPAs, Ramsar Sites and other relevant sites (e.g. non-statutory designated

sites and Ancient Woodlands) which may be affected by dust soiling. The most sensitive ecological receptor in the vicinity of each section (considering the likely effect and the value of the site's ecological assets as recommended in the IAQM guidance) are presented in Table 1.6.

Table 1.6: Ecological Receptor Identification and Sensitivity

Section	Most Sensitive Ecological Receptors	Sensitivity as per IAQM Guidance
Proposed Route Section		
Section A	Four parcels of Ancient Woodland <20m from the Order Limits	Low
Section B	Seven parcels of Ancient Woodland <20m from the Order Limits	Low
Section C	One parcel of Ancient Woodland <20m from the Order Limits	Low
Section D	Thames Basin Heaths SPA; Eelmoor Marsh SSSI; Bourley and Long Valley SSSI; and Basingstoke Canal SSSI <20m from the respective Order Limits	High
Section E	Thames Basin Heaths SPA; Thursley, Ash, Pirbright and Chobham SAC; and Colony Bog and Bagshot Heath SSSI <20m from the respective Order Limits	High
Section F	Thames Basin Heaths SPA; Thursley, Ash, Pirbright and Chobham SAC; Colony Bog and Bagshot Heath SSSI and Chobham Common SSSI <20m from the respective Order Limits	High
Section G	Dumsey Meadow SSSI <20m from the Order Limits	Medium
Section H	Four Sites of Nature Conservation Importance (SNCI) <20m from Order Limits	Low
Construction Logistics Hubs		
A31 Ropley Dean	No ecological receptors within 50m of the Order Limits	-
MoD Deepcut	Frith Hill SNCI <20m from the respective Order Limits	Low
Hartland Park Village	Pyestock (North Grasslands) SINC <20m from the Order Limits	Low
New Road Windlesham	No ecological receptors within 50m of the Order Limits	-
Brett Aggregates Yard	Land west of Littleton Lane SNCI <20m from the Order Limits	Low
A31/A32	Chawton Park Wood SINC and Chawton Paceway SINC <50m from the Order Limits	Low

Step 2A: Assess the Risk of Dust Impacts – Define the Potential Dust Emission Magnitude

1.6.7 The works associated with the construction of each section and construction logistics hub would be split into several stages, which would involve different periods of earthworks, construction (including pipeline installation and setting up the construction logistics hubs) and trackout and activity levels would not necessarily peak simultaneously. The dust emission magnitudes of each activity have been specified using the definitions of dust emission magnitudes as presented in the

IAQM guidance and using professional judgement in line with IAQM guidance (IAQM, 2016). These are provided in Table 1.7.

1.6.8 The whole length of each route section has been assessed in isolation. The section lengths range from 4km to 19km. Therefore, this is a precautionary approach as the distance between the construction phase activities and a majority of the receptors included in the receptor counts far exceeds the distance that dust from the site would normally travel (i.e. up to 350m).

1.6.9 As discussed in Section 1.5, a small number of single-storey garages would need to be removed at Stake Lane to the west of Farnborough Station to facilitate installation of the replacement pipeline. This would involve minimal demolition activities with limited dust-generating potential anticipated. Therefore, the effects of dust from demolition activities are not considered further in this assessment.

Table 1.7: Dust Emission Magnitude

Proposed Route Section or Construction Logistics Hub	Earthworks (Including Topsoil Strip and Excavation of Pipeline Trench)			Construction (Including Pipeline Installation and Setup of the Construction Logistics Hubs)		Trackout	
	Earth Moving Vehicles Active at Any One Time	Total Earthworks (Tonnes)	Dust Emission Magnitude	Construction Volume (m3)	Dust Emission Magnitude	Maximum HDV Movements Per Day	Dust Emission Magnitude
Proposed Route Section							
Section A	5-10	20,000-100,000	Medium	<25,000	Small	<10	Small
Section B	5-10	20,000-100,000	Medium	<25,000	Small	<10	Small
Section C	5-10	20,000-100,000	Medium	<25,000	Small	<10	Small
Section D	<5	<20,000	Small	<25,000	Small	<10	Small
Section E	<5	<20,000	Small	<25,000	Small	<10	Small
Section F	5-10	20,000-100,000	Medium	<25,000	Small	<10	Small
Section G	5-10	20,000-100,000	Medium	<25,000	Small	<10	Small
Section H	<5	<20,000	Small	<25,000	Small	<10	Small
Construction Logistics Hub							
A31 Ropley Dean	<5	<20,000	Small	<25,000	Small	<10	Small
MoD Deepcut	<5	<20,000	Small	<25,000	Small	<10	Small
Hartland Park Village	<5	<20,000	Small	<25,000	Small	<10	Small
New Road Windlesham	<5	<20,000	Small	<25,000	Small	<10	Small
Brett Aggregates Yard	<5	<20,000	Small	<25,000	Small	<10	Small

Proposed Route Section or Construction Logistics Hub	Earthworks (Including Topsoil Strip and Excavation of Pipeline Trench)			Construction (Including Pipeline Installation and Setup of the Construction Logistics Hubs)		Trackout	
	Earth Moving Vehicles Active at Any One Time	Total Earthworks (Tonnes)	Dust Emission Magnitude	Construction Volume (m3)	Dust Emission Magnitude	Maximum HDV Movements Per Day	Dust Emission Magnitude
A31 / A32	<5	<20,000	Small	<25,000	Small	<10	Small

Step 2B: Assess the Risk of Dust Impacts – Define the Sensitivity of the Area

1.6.10 Table 1.8 displays the sensitivities of the surrounding areas to earthworks, construction and trackout, based on the criteria set out in the IAQM guidance, numbers of receptors within certain distance bands of the boundary of each section (see Table 1.4) and construction logistics hub (see Table 1.5) and existing PM_{10} concentration (see Section 4). The IAQM guidance recommends that the receptor distance is based on the distance from the source rather than the Order Limits. This assessment was undertaken on the basis that all relevant activities (i.e. earthworks, construction and trackout) take place at the Order Limits of each study area. This represents a conservative assumption, as in practice most activities would not take place at the Order Limits, thus increasing the distance between the source and receptor.

Table 1.8: Sensitivity of the Area for Human Receptors at Each Proposed Route Section and Construction Logistics Hub

Study Area	Potential Impact	Sensitivity of the Surrounding Area [1]		
		Earthworks (Including Topsoil Strip and Excavation of Pipeline Trench)	Construction (Including Pipeline Installation and Setup of the Construction Logistics Hubs)	Trackout
Proposed Route Section				
Section A	Dust soiling	Medium	Medium	Medium
	Human health	Low	Low	Low
Section B	Dust soiling	Medium	Medium	Medium
	Human health	Low	Low	Low
Section C	Dust soiling	Medium	Medium	Medium
	Human health	Low	Low	Low
Section D	Dust soiling	High	High	High
	Human health	Low	Low	Low
Section E	Dust soiling	High	High	High
	Human health	Low	Low	Low
Section F	Dust soiling	High	High	High
	Human health	Low	Low	Low
Section G	Dust soiling	High	High	High

Study Area	Potential Impact	Sensitivity of the Surrounding Area [1]		
		Earthworks (Including Topsoil Strip and Excavation of Pipeline Trench)	Construction (Including Pipeline Installation and Setup of the Construction Logistics Hubs)	Trackout
	Human health	Low	Low	Low
Section H	Dust soiling	High	High	High
	Human health	Low	Low	Low
Construction Logistics Hub				
A31 Ropley Dean	Dust soiling	Low	Low	Medium
	Human health	Low	Low	Low
MoD Deepcut	Dust soiling	Low	Low	Medium
	Human health	Low	Low	Low
Hartland Park Village	Dust soiling	Low	Low	N/A[2]
	Human health	Low	Low	
New Road Windlesham	Dust soiling	Low	Low	Low
	Human health	Low	Low	Low
Brett Aggregates Yard	Dust soiling	Low	Low	Low
	Human health	Low	Low	Low
A31/A32	Dust soiling	Low	Low	N/A[2]
	Human health	Low	Low	

Note 1: Demolition activities are not considered in this assessment due to the minimal dust-generating activities anticipated during construction of the project.

Note 2: Trackout activities are N/A as there are no sensitive receptors within 50m of the likely route(s) used by construction vehicles, up to 50m from the site access points.

1.6.11 Table 1.9 displays the sensitivities of the assessed ecological sites to earthworks, construction and trackout activities based on the proximity of the site and the value of the site's ecological assets, in line with IAQM guidance.

Table 1.9: Sensitivity of the Area for Ecological Receptors at Each Proposed Route Section

Proposed Route Section	Ecological Site	Sensitivity of the Area to Ecological Impacts		
		Earthworks (Including Topsoil Strip and Excavation of Pipeline Trench)	Construction (Including Pipeline Installation and Setup of the Construction Logistics Hubs)	Trackout
Proposed Route Section				
Section A	Ancient woodlands	Low	Low	Low
Section B	Ancient woodlands	Low	Low	Low
Section C	Ancient woodlands	Low	Low	Low
Section D	SPAs	High	High	High
Section E	SPAs and SACs	High	High	High
Section F	SPA and SAC	High	High	High

Proposed Route Section	Ecological Site	Sensitivity of the Area to Ecological Impacts		
		Earthworks (Including Topsoil Strip and Excavation of Pipeline Trench)	Construction (Including Pipeline Installation and Setup of the Construction Logistics Hubs)	Trackout
Section G	SSSI	Medium	Medium	Medium
Section H	SNCI	Low	Low	Low
Construction Logistics Hub				
A31 Ropley Dean	N/A[1]			
MoD Deepcut	SNCI	Low	Low	Low
Hartland Park Village	SINC	Low	Low	Low
New Road Windlesham	N/A[1]			
Brett Aggregates Yard	SNCI	Low	Low	Low
A31/A32	SINCs	Low	Low	Low

Note 1: 'N/A' as there are no sensitive ecological receptors within 50m of the Order Limits or likely route(s) used by construction vehicles, up to 50m from the site access points.

Step 2C: Assess the Risk of Dust Impacts – Define the Risk of Impacts

1.6.12 Using the dust emission magnitudes for the various activities in Table 1.7 and the sensitivity of the area provided in Table 1.8 and Table 1.9, the definition of the risks for each activity are provided in Table 1.10 for dust soiling at human receptors, human health impacts and impacts on ecological sites.

Table 1.10: Dust Risk at Human and Ecological Receptors

Potential Impact	Risk[1]		
	Earthworks	Construction	Trackout
Proposed Route Section			
Section A			
Dust soiling	Medium risk	Low risk	Negligible risk
Human health	Low risk	Negligible risk	Negligible risk
Ecological	Low risk	Negligible risk	Negligible risk
Section B			
Dust soiling	Medium risk	Low risk	Negligible risk
Human health	Low risk	Negligible risk	Negligible risk
Ecological	Low risk	Negligible risk	Negligible risk
Section C			
Dust soiling	Medium risk	Low risk	Negligible risk
Human health	Low risk	Negligible risk	Negligible risk
Ecological	Low risk	Negligible risk	Negligible risk
Section D			
Dust soiling	Low risk	Low risk	Low risk

Potential Impact	Risk[1]		
	Earthworks	Construction	Trackout
Human health	Negligible risk	Negligible risk	Negligible risk
Ecological	Low risk	Low risk	Low risk
Section E			
Dust soiling	Low risk	Low risk	Low risk
Human health	Low risk	Low risk	Negligible risk
Ecological	Low risk	Low risk	Low risk
Section F			
Dust soiling	Medium risk	Low risk	Low risk
Human health	Low risk	Negligible risk	Negligible risk
Ecological	Medium risk	Low risk	Low risk
Section G			
Dust soiling	Medium risk	Low risk	Low risk
Human health	Low risk	Negligible risk	Negligible risk
Ecological	Medium risk	Low risk	Negligible risk
Section H			
Dust soiling	Low risk	Low risk	Low risk
Human health	Low risk	Low risk	Negligible risk
Ecological	Negligible risk	Negligible risk	Negligible risk
Construction Logistics Hub			
A31 Ropley Dean			
Dust soiling	Negligible risk	Negligible risk	Negligible risk
Human health	Negligible risk	Negligible risk	Negligible risk
Ecological	N/A[2]		
MoD Deepcut			
Dust soiling	Negligible risk	Negligible risk	Negligible risk
Human health	Negligible risk	Negligible risk	Negligible risk
Ecological	Negligible risk	Negligible risk	Negligible risk
Hartland Park Village			
Dust soiling	Negligible risk	Negligible risk	N/A[3]
Human health	Negligible risk	Negligible risk	
Ecological	Negligible risk	Negligible risk	Negligible risk
New Road Windlesham			
Dust soiling	Negligible risk	Negligible risk	Negligible risk
Human health	Negligible risk	Negligible risk	Negligible risk
Ecological	N/A[2]		
Brett Aggregates Yard			
Dust soiling	Negligible risk	Negligible risk	Negligible risk
Human health	Negligible risk	Negligible risk	Negligible risk
Ecological	Negligible risk	Negligible risk	Negligible risk
A31/A32			
Dust soiling	Negligible risk	Negligible risk	Negligible risk

Potential Impact	Risk[1]		
	Earthworks	Construction	Trackout
Human health	Negligible risk	Negligible risk	Negligible risk
Ecological	Negligible risk	Negligible risk	Negligible risk
Highest dust soiling risk	**Medium risk**	**Low risk**	**Low risk**
Highest human health risk	**Low risk**	**Low risk**	**Negligible risk**
Highest ecological risk	**Medium risk**	**Low risk**	**Low risk**

Note 1: Demolition activities are not considered in this assessment due to the minimal dust-generating activities anticipated during construction of the project.

Note 2: Earthworks and construction activities are 'N/A' as there are no ecological receptors within 50m of the site boundary.

Note 3: Trackout activities are 'N/A' as there are no sensitive receptors within 50m of the likely route(s) used by construction vehicles, up to 50m from the site access points.

1.6.13 The results in Table 1.10 indicate that for the pipeline installation and the construction of the logistics hubs, there would be a maximum of a medium risk to sensitive human receptors with regard to dust soiling effects from earthwork activities and a maximum of a low risk from construction and trackout activities. However, with the adoption of the standard good practice measures outlined in Table 1.3, there are not expected to be any significant effects to amenity.

1.6.14 For human health effects, although the results in Table 1.10 indicate that there would be a low to negligible risk to sensitive receptors, the good practice measures would be developed from the medium risk identified for dust soiling effects. This would also prevent or reduce potential dust or PM_{10} (and $PM_{2.5}$) emissions which are associated with health effects such as exacerbating existing conditions including asthma and other lung conditions.

1.6.15 The results in Table 1.10 indicate that there would potentially be a medium risk for ecological receptors with regard to dust soiling effects from earthworks and a low risk from construction and trackout activities. However, with the adoption of the standard good practice measures outlined in Table 1.3, there are not expected to be any significant effects to ecological receptors.

Step 3: Standard Good Practice Measures

1.6.16 Standard good practice measures would be applied to reduce the risk of dust. These have been derived from those specified in the IAQM guidance. The measures would normally be sufficient to reduce dust nuisance, risk to human health or effects on ecological sites to a 'not significant' effect. These measures are set out in the REAC and secured through DCO requirements such as the CoCP, and would be used throughout the project.

Step 4: Determine Significant Effects

1.6.17 There are no potentially dust-generating activities proposed as part of the project that could not be managed using standard good practices, so as to prevent significant effects at any off-site receptor, including those located within 20m of the Order Limits.

1.6.18 It is assumed that all low to medium risks identified can be reduced through the standard good practice measures set out in the REAC.

1.6.19 IAQM guidance notes that, with the application of good practice measures, the environmental effect would not be significant at any off-site receptor. IAQM guidance also notes that, even with a rigorous package of these good practice measures in place, occasional impacts may occur but any occasional short term impacts would not be sufficient to alter the effect from 'not significant' to 'significant'.

Emissions from Construction-Related Road Traffic

1.6.20 As presented in Section 1.5, the highest increase in AADT at the construction logistics hubs associated with construction traffic outside of an AQMA would be 44 HDVs and 258 LDVs at Hartland Park construction logistics hub. Within an AQMA, at the Brett Aggregates construction logistics hub the increase in AADT would be a maximum of 20 HDVs and less than 100 LDVs. These increases would not exceed the EPUK/IAQM screening criteria set out below.

- the change in HDV flows is greater than 25 AADT within or adjacent to an AQMA or greater than 100 AADT elsewhere; and
- the change in LDV flows is greater than 100 AADT within or adjacent to an AQMA or greater than 500 AADT elsewhere.

1.6.21 On this basis, the effects from construction road traffic on air quality are not considered to represent a significant effect on receptors adjacent to the local road network. The air quality effects would be described as negligible.

1.6.22 In relation to diversions, Section 6 of the EPUK/IAQM guidance (EPUK/IAQM, 2017) states that '*the assessment of* [air quality] *impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short term impacts'*. Therefore, as the diversions are only in place for a short duration, typically one to two weeks, there would be no ongoing long-term risk of the relevant AQO being exceeded through the presence of the diverted traffic.

1.6.23 Therefore, the air quality effects from construction traffic, including diversions, on human and ecological receptors in rural and urban areas are considered to be not significant on the environment.

Carbon Emissions

1.6.24 Table 1.11 sets out the results of the carbon assessment. The construction stage sub-total of 52,503 tonnes of CO_2 equivalent is 0.011% of the 460,200,000 tonnes emitted by the UK as a whole in 2017. During each year of operation, the average CO_2 equivalent emissions of 2,298 tonnes (137,896 tonnes divided by an estimated 60 years of operation) represents 0.0005% of the UK 2017 CO_2 emissions.

1.6.25 The carbon assessment for materials consumption includes all greenhouse gas emissions from raw material extraction through to provision of the finished product for sale. Material such as steel, a major component of the pipeline, has a relatively

high embodied carbon value from extraction of primary resources, through processing and refining, and bulk transport to site.

Table 1.11: Estimated Total Carbon Emissions for the Project

Phase	Description	Estimated CO_2 Equivalent Tonnes
Project – Pipeline		
Construction Phase: Materials Consumption	Steel for pipes and valves, asphalt, primary and secondary aggregates, concrete.	40,690
Construction Phase: Freight	Road transport for above materials plus additional sea freight for imported pipe.	1,902
Construction Phase: Plant	Earthmoving plant - fuel consumption.	9,911
Construction Phase Subtotal		52,503
Operational Phase – total for 60 years of operation	Pumping and lighting (electrical consumption), airborne pipeline inspection (fuel consumption).	137,896
Project total		**190,398**

1.7 Mitigation

1.7.1 No potentially significant effects have been identified. Therefore, no mitigation measures are proposed.

1.8 Residual Impacts (With Mitigation)

1.8.1 This assessment has shown that there are no potentially significant effects in relation to air quality.

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