6. AIR QUALITY

6.1 Introduction

6.1.1 This chapter presents the air quality assessment which has been completed for the Preliminary Environmental Information Report (PEIR). It therefore presents the initial assessment results of the Scheme air quality effects made to date. Further assessment work will be undertaken prior to the submission of the DCO application to update the assessment which will be presented in the Environmental Statement (ES), submitted with the DCO application. The PEIR presents the following information;

- Analysis of Existing Baseline conditions;
- Presentation of Initial Air Quality Modelling Results for;
  - Base Year (2012)
  - Future Baseline Conditions (i.e. the conditions predicted to exist in 2021 without the Scheme – referred to as the 'reference case')
  - Opening Year with implementation of the proposed Scheme (2021 – referred to the 'assessed case')).

6.1.2 The operational phase associated with the implementation of the Scheme will have an effect on the volume and composition of the future traffic flows and therefore has the potential to affect air quality in both the immediate and wider vicinity of the Silvertown Tunnel itself.

6.1.3 Although not covered in the PEIR, the assessment of air quality impacts generated during the construction phase of the Scheme will be reported in the ES. The construction assessment will focus on the air quality impacts from construction dust, construction traffic movements and from the impacts of associated activities including emissions from construction plant.

6.1.4 The operational assessment as part of the PEIR has focused on the changes in air quality at worst-case receptors. These are receptors close to roads which have a qualifying change in flows as a result of the Scheme (see paragraph 6.3.31). Receptors closest to roads and junctions are selected in order to ensure that the highest concentrations and changes in pollutants are considered in the assessment. The term 'receptors' encompasses residential properties, schools, hospitals etc, and covers those locations where there is consistent relevant exposure to air quality impacts.

6.1.5 The impact of emissions from the tunnel portals has also been assessed. This chapter discusses the approach to evaluating significant effects of the operation of the Scheme on local air quality. However, it should be noted that a definitive judgement on significance has not been made at this stage as this requires the assessment of all receptors which are likely to exceed the air quality strategy objectives (where pollutant concentrations are higher than pollutant specific thresholds set out in legislation), and not just worst-case receptors. The PEIR therefore provides the initial air quality modelling results for the purposes of the statutory consultation on the Scheme.

6.1.6 Due to changes in DMRB-associated guidance (Ref 6-1) (regarding the approach to determining speeds assigned in the air quality model) issued during the time that the air quality assessment was being undertaken to inform the PEIR, the modelling will need to be updated in the ES to take account of this guidance (this is explained in paragraph 6.8.1). The definitive judgement of the significance of the air quality effects of the Scheme will therefore be made as part of the full air quality assessment in the ES.

6.1.7 The pollutants affecting air quality that are of primary concern are nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) as these are the key traffic-related pollutants. These pollutants are harmful to human and ecological health (dealt with in Chapters 9 and 10). Traffic related emissions are the primary cause of poor air quality within the study area, where there are existing measured exceedences against the national Air Quality Strategy (AQS) (Ref 6-2) objectives/EU Limit Values. This is common across London where there are widespread exceedences and where it is anticipated that the London Urban Agglomeration Area (the area used by the Department of Environment, Food & Rural Affairs (Defra) to determine whether it complies with the EU Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe directive (Ref 6-3)) will not be met until after 2030, although this expectation is currently under review as part of Defra’s Action Plan (Ref 6-4) following the recent Supreme Court judgment (Ref 6-5).

6.2 Regulatory and Policy Framework

6.2.1 This air quality assessment of the Scheme in the operation phase has been undertaken in accordance with current guidance for the assessment of road schemes (namely the Design Manual for Roads and Bridges (DMRB) (Ref 6-6) and associated Interim Advice Notes (IAN)). The guidance ensures the assessment considers European and national legislation. The assessment also takes into account national, regional and local plans and policies relating to air quality relevant to the Scheme. A summary of the relevant legislation and its application in relation to the Scheme is presented in Table 6-1. The national policies and the requirements of these policies in relation to the Scheme are provided in Table 6-2.

Table 6-1 Air Quality - Regulatory Framework

Description of Legislation	Considered in Assessment
Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe 2008/50/EC	
The 2008 ambient air quality directive (2008/50/EC) sets legally binding limits for concentrations of specific air pollutants. It merges, consolidates and replaces the majority of previous EU air quality legislation, and incorporates the 4th daughter directive.	The impact of the Scheme in the context of the achieving compliance with the EU limit values is determined following current guidance. Highways England Interim Advice Note (IAN) 175/13 (Ref 6-7) available on request from Highways England) has been followed to ascertain whether the Scheme represents a risk with respect to compliance with the EU Directive.
Part IV of The Environment Act 1995	
The 1995 Environmental Act (Ref 6-8) contains provisions for protecting air quality in the UK and for local air quality management. It requires UK Government to produce a national Air Quality Strategy (AQS) which contains standards, Air Quality Objectives and measures for improving ambient air quality and defines Local Air Quality Management (LAQM).	The assessment assesses against the AQS objectives that were borne out of this Act.
Statutory Instruments No. 1001, the Air Quality (Standards) Regulations 2010 **(The Stationery Office Ltd, 2010)**	
The Air Quality (Standards) Regulations 2010 (Ref 6-9) transpose into English law the requirements of Directives 2008/50/EC on	This assessment addresses likely potential increases in air pollution concentrations caused by the operation of the Scheme by reference to the relevant Limit Values as defined in Schedule 2 of the Air Quality

Description of Legislation	Considered in Assessment
ambient air quality.	Standards Regulations (2010).
Statutory Instruments No. 928, the Air Quality (England) Regulations 2000 **(The Stationery Office Ltd, 2000)**	
The Air Quality (England) Regulations 2000 (Ref 6-10) set national air quality objectives levels for local authorities to meet in England.	The assessment determines the potential increases in air pollution concentrations against the relevant Air Quality Objectives Levels as defined in the Air Quality (England) Regulations (2000)

Table 6-2 Air Quality Policy Framework

Description of Policy	Considered in Assessment
National Policy Statement **for National Networks (NPSNN) (Department for Transport (DfT), 2014)**	
The Secretary of State (SoS) NPSNN is the primary policy against which DCO applications for the nationally significant road and rail schemes determination of the Scheme DCO are examined and determined under the Planning Act 2008 (Ref 6-11). The NPS document (Ref 6-12) states that an assessment of impacts should be undertaken *"where the impacts of the project (both on and off scheme) are likely to have significant air quality effects".* The NPS also outlines what should be included as part of an	The assessment satisfies the requirements of the NPSNN by describing existing air quality conditions, forecasting air quality at the time of opening (the future baseline), and describing the significant air quality effects of the Scheme in operation, their mitigation and any residual effects. Additionally the assessment evaluates the significance of the air quality effects through the application of Highways England IAN 174/13 (Ref 6-13) in the ES. The effect of the operation of the Scheme on compliance with the Air Quality Directive (2008/50/EU) will be determined through the application of a compliance risk assessment (Highways England IAN 175/13) in the ES. The PEIR presents a preliminary indicative review of

Description of Policy	Considered in Assessment
applicant's air quality assessment and the principles which the SoS will apply in determining DCO applications. It states that: *The Secretary of State should refuse consent where after taking into account mitigation, the air quality impacts of the Scheme will:* • *result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or* • *affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.*	compliance risk based on the modelling of a set of worst-case receptors.
***The National Planning Policy Framework (NPPF)* (Department for Communities and Local Government, 2012)**	
The NPPF (Ref 6-14) replaces previous Planning Policy Statements, including PPS23 on Planning and Pollution Control. The NPPF outlines a set of core land-use planning principles that should underpin both plan making and decision-taking. The principle relating to air quality states that "*The planning system should contribute to, and enhance the natural and local environment by...preventing both new and existing development from contributing to or being put at*	This assessment has predicted concentrations at worst-case sensitive receptors to determine whether the residual air quality effects of the Scheme are likely to be significant. Highways England IAN 174/13 will be used in the ES as the guidance to assess against paragraph 119 of the NPPF, evaluating whether the Scheme is considered to have a significant impact on air quality affecting both ecological and human receptors, thus the local and natural environment.

Description of Policy	Considered in Assessment
unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;"	
***The National Planning Practice Guidance – Air Quality* (Department for Communities and Local Government, 2014)**	
By the NPPG (Ref 6-15) the government revises and updates national planning practice guidance to support the NPPF in order to make it more accessible. The practice guidance includes advice relating to; planning and air quality, the role of Local Plans with regard to air quality, when air quality is likely to be relevant to a planning decision, what should be included within an air quality assessment and how impacts on air quality can be mitigated.	The assessment follows the guidance which contains details of a number of recommendations when undertaking an air quality assessment for the purposes of applying relevant consideration to the NPPF policy. The guidance encourages early engagement with local planning and environmental health departments which has been a feature of the assessment work undertaken to date. Additionally the following topics are covered within the assessment: • a description of Baseline conditions and how these could change; • relevant air quality concerns; • the assessment methods to be adopted and any requirements around verification of modelling air quality; • sensitive locations; • the basis for assessing impact and determining the significance of an impact; • acceptable mitigation measures
***The Air Quality Strategy for England, Scotland, Wales and Northern Ireland* (Department for the Environment, Food and Rural Affairs (Defra), 2007)**	
The strategy sets out a way forward for	The assessment has regard to the AQS in determining impact of the

Description of Policy	Considered in Assessment
development work and planning addressing air quality issues and sets air pollution standards to protect the population's health and the environment.	Scheme on air quality.
Clearing the Air: The Mayor's Air Quality Strategy, Greater London Authority **(Greater London Authority, 2010),**	
The Mayor of London's Air Quality Strategy (Ref 6-16) seeks to set out a detailed air quality strategy for London in order to deliver the required reductions in particulate matter less than 10 microns in diameter (PM_{10}) and nitrogen dioxide (NO_2) concentrations in London to meet the EU limit values. The strategy primarily concerns commercial and residential development. Policies that may be considered relevant to large scale infrastructure proposals such as the proposed Silvertown Tunnel include: Policy 6 – Reducing emissions from construction and demolition sites. Policy 7 – Using the planning process to improve air quality. Policy 10 – Improved air quality in the public realm	NO_2 and Particulates (PM_{10}/$PM_{2.5}$) are the pollutants assessed as part of the assessment of the Scheme's effect on local air quality. Institute of Air Quality Management (2014) (Ref 6-17) guidance on the assessment of construction phase emissions will be utilised in the ES assessment, thus allowing assessment against Policy 6. The key relevant principle of Policy 7 is to ensure measures to improve air quality are embedded in the planning process. An example of this is that Policy states that all new developments in London shall be at least 'air quality neutral'. The Mayor's Air Quality Neutral Policy (Ref 6-18) was released in 2013 but states that *"Major transport infrastructure development, such as that proposed by TfL, is assessed using the Transport Advisory Guidance (TAG) methodology, which estimates changes to* NO_x *and PM emissions, and then applies an economic valuation. It is therefore suggested that it would be inappropriate to apply the air quality neutral policy to these types of development."* Therefore an assessment of whether the Scheme is air quality neutral has not been carried out, although the principle to minimise residual effects by integrating mitigation into the design process, for instance

Description of Policy	Considered in Assessment
	user-charging to control traffic flow, is considered in the assessment. In accordance with the current guidance the assessment has predicted concentrations measured at worst-case receptors. The significance judgement required by Highways England IAN 174/13 evaluates the number of receptors affected by the proposed Scheme and whether they are likely to be exposed to poor air quality. If an overall significant adverse effect is predicted, mitigation measures must be considered and tested, and significance re-evaluated to minimise effects; this will be fully undertaken in the ES when all receptors (rather than just worst-case receptors) are modelled. Policy 10 relates to improving air quality in the public realm by the adoption of planting which serves to increase green cover which will trap particulate matter. In relation to paragraph 4.12.2 of the Strategy, the objective of the Scheme is to ensure effective traffic management which seeks to reduce congestion to lower pollution emissions.
***The London Plan Spatial Development Strategy for London, consolidated with alterations since 2011* (Mayor of London, 2015)**	
The London Plan sets out the spatial development strategy for Greater London (Ref 6-19) and brings together the geographical and locational aspects of the Mayor's other strategies, including the Mayor's Air Quality Strategy. Policy 7.14 ('Improving Air Quality') stipulates a	There is no explicit discussion of direction as to how infrastructure projects should apply London Plan policy from an air quality perspective. However as discussed previously (in general accordance with the policy of the London Plan) the assessment evaluates the number of receptors affected by the proposed Scheme and whether they are likely to be exposed to poor air quality. As well as those areas where traffic flows

Description of Policy	Considered in Assessment
number of air quality considerations which should be addressed in any development proposal. The key themes are almost identical to Policy 7 of the Mayor's Air Quality Strategy and include minimising exposure to poor air quality, reducing emissions from construction and demolition, not permitting development that will lead to further deterioration in areas of existing poor air quality, and the provision of measures to reduce emissions from a development.	are expected to change significantly as a result of Scheme, the assessment focuses on areas of existing poor air quality. This has been achieved through the consideration evaluation of effects on of AQMAs and AQFAs as well as through early consultation with local authorities to pinpoint pollution hotspots. Mitigation is built in as part of the reference design of the tunnel and additional measures will be implemented should the local air quality assessment demonstrate significant adverse impacts. Construction air quality impacts will be fully evaluated in the ES in accordance with IAQM (2014) guidance.
***The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance (SPG)* (Mayor of London, 2015)**	
The SPG (Ref 6-20) sets out how impacts on air quality can be minimised during the construction phase of development and advises on necessary mitigation measures. It focuses on the following five areas: demolition; earthworks; construction; trackout; and non-road mobile machinery (NRMM).	The construction phase assessment that will be presented in the ES utilises the IAQM (2014) guidance on assessing the impact of dust emissions through demolition, earthworks, construction and trackout.
***Sustainable Design and Construction SPG* (Mayor of London, 2014)**	
The section of this SPG (Ref 6-21) relating to air quality demonstrates how the principles detailed in the London Plan and the Mayor's Air Quality	The air quality methodology adopted for the Scheme assessment includes the assessment requirements detailed in the SDC SPG.

Description of Policy	Considered in Assessment
Strategy are to be incorporated into the design and construction of development. It provides guidance on the following key areas: ▪ assessment requirements; ▪ construction and demolition; ▪ design and occupation; ▪ air quality neutral policy for buildings and transport; and emissions standards for combustion plants.	

6.3 Methodology

Consultation

6.3.1 Regular consultation with regulatory bodies, local boroughs, stakeholder groups and air quality peers (TfL's air quality team, external air quality peer review) has been undertaken to ensure that the assessment methodology encompasses local issues and concerns.

Scoping Opinion

6.3.2 A scoping report was circulated during the summer of 2014, and a scoping opinion was received provided by the Planning Inspectorate (PINS) on behalf of the Secretary of State. The London Borough of Tower Hamlets, Natural England (NE), and Public Health England (PHE) and other bodies were consulted by PINS during the preparation of the scoping opinion.

6.3.3 The Planning Inspectorate welcomed the TfL's approach of utilising the DMRB methodology and associated Interim Advice Notes (IANs) to carry out the operational air quality assessment and agreed that the scope of the assessment should not extend to odour. The Planning Inspectorate also stressed the importance of holding consultations with environmental health officers (EHOs) in the host boroughs of Tower Hamlets, Greenwich and Newham to agree the scope of the air quality study area and the selection of receptor locations. Additionally the Planning Inspectorate stated that in AQMAs, any increase of pollutant concentrations (even if very small) should not be categorised as having a negligible impact. This echoed a comment originally made by LBTH. The scoping opinion and full responses can be found in Appendix 5.A.

6.3.4 It is noted that the air quality assessment has been undertaken followed published government advice (DMRB and associated IANs) accepted by PINs on other road schemes, A556 etc. The guidance recognises that the assessments are undertaken using modelling tools and as such there is a measure of uncertainty in the results. Whilst very small changes in pollutant concentrations are modelled there is a high level of uncertainty (in both the modelled changes and the ability to monitor such a small change) that means it would be inappropriate to include these results when making decisions in relation to the overall significance of the scheme impacts. The guidance states that changes in pollutant concentrations of less than 1% (against the air quality threshold) should not be considered as significant and not considered in the overall view of significance. This is consistent with approaches adopted by other organisations such as the Environment Agency and Natural England. Whilst therefore all changes in pollutant concentrations will be reported, the overall judgement of significance will be made in accordance with the published government advice.

6.3.5 NE and PINS both noted that the assessment should take into account of the risks of air pollution to sensitive habitat areas/designated sites and utilise publically available data on the Air Pollution Information System (APIS) website (Ref 6-22). The air quality impacts of the Scheme on designated sites will be fully assessed in the ES.

6.3.6 PHE listed a number of recommendations for the assessment that covered the scope of the assessment, the use of air quality tools, monitoring data, assessed receptors and modelling. The comments and full responses are listed in Appendix 5.A in Volume 3 of this PEIR.

Non-statutory Public Consultation

6.3.7 A non-statutory consultation on the Scheme was undertaken in the autumn of 2014 that detailed the findings of a high level air quality appraisal. At the time of publication, indicative provisional traffic datasets were available but the final charging regime had not been agreed. Therefore changes in emissions based on initial traffic data were presented to provide an indication as to where and how air quality may be affected as a result of the Scheme in operation. The percentage change in NO_x emission rate on each affected road (as per the DMRB traffic screening criteria) was displayed on a number of figures that detailed the location and magnitude of emissions change on roads likely to be affected by the Scheme. Additionally, provisional results and locations of air quality monitoring sites undertaken by TfL were provided. The full completed dataset of this monitoring survey is presented in the Baseline data section of this chapter.

Meetings with Host Boroughs

6.3.8 As part of the pre-assessment consultation period and following the recommendation of PINS, each of the three host borough’s Environmental Health Officers (or equivalent) were consulted on the initial air quality methodology in the autumn of 2014. The London Borough of Newham (LBN) requested that wider impacts are captured in the assessment, i.e. those away from the immediate Scheme. In particular, the Canning Town roundabout and the A13/A406 interchange were identified as locations that should be included in the air quality assessment. These two locations were both covered by the affected road network as defined by the DMRB traffic screening criteria, and were therefore encompassed by the assessment.

6.3.9 The Royal Borough of Greenwich (RBG) were the second local authority consulted, during September 2014. RBG raised a point regarding whether the proposed East of Silvertown crossings will be considered in the Silvertown air quality assessment. It was explained that any future application for consent to build the East of Silvertown crossings would include an assessment of the Silvertown Tunnel in the future 'without' further crossings Baseline scenario, assuming that the Silvertown Tunnel would be built ahead of the proposed East of Silvertown river crossings. RBG also demonstrated concern that the Defra background maps would be used in the assessment unadjusted. This was based on the opinion that the current Defra tools are likely to be overly optimistic. This has been addressed in the air quality assessment by using the most recent advice in DMRB which corrects for the perceived optimism.

6.3.10 RBG highlighted Sun-in-the-Sands roundabout (where the A102 crosses the A207/A2213) as a location that should be included in the local air quality assessment. Additionally, Woolwich Road was highlighted as an area of existing poor air quality. Both of these locations are covered in the local air quality assessment as they are within 200m of, or form part of the affected road network as defined by the DMRB traffic screening criteria.

6.3.11 London Borough of Tower Hamlets (LBTH) was consulted in January 2015 and was concerned that the base year used to verify the dispersion modelling was 2012 rather than a more up to date year. It was explained that to update the base year traffic model to a more recent year would involve a significant amount of work whereby a new model would not be available for a year or so. Furthermore, re-basing the model from a 2012 base to a 2014 base would be expected to produce little material change in the Silvertown Scheme forecasts.

6.3.12 The DfT's WebTAG guidance (Ref 6-23) allows for models to be based on data that is up to six years old; it was therefore considered that the traffic model was fit for purpose for use in the assessment.

6.3.13 LBTH raised a concern regarding the Defra background map concentrations being overly optimistic in the opening year, as per the previous comment made by RBG. In addition, LBTH questioned whether the London Atmospheric Emissions Inventory (LAEI) (Ref 6-24) rather than the Defra background maps as it is of a higher resolution and more representative. It was explained that the LAEI is a model that is run for various years and does not coincide with the scheme opening. In addition the LAEI is based on different assumptions with regard to the traffic data that underpins the modelling predictions, whereas the assessment of the Silvertown scheme will need to be undertaken based on outputs from a traffic model. The traffic model is required as this is the tool that predicts the change in traffic flows as a result of the scheme and consequently what the impact will be of the scheme on local air quality. It is therefore not practical for the LAEI to be utilised in the assessment of the schemes impacts.

6.3.14 A more general query from LBTH regarded which permitted/consented developments should be considered within the assessment. Chapter 17 of the PEIR details the developments that are included in the future year (2021) traffic datasets.

6.3.15 A review was undertaken as a result of these concerns to show the likely difference in projections from the LAEI and the DMRB methodology (see paragraph 6.3.67 onwards).

Updated Assessment and Methodology Consultation with Host Boroughs

6.3.16 Following on from the initial meetings with each of the host boroughs, a further consultation was undertaken in the form of a presentation and briefing note that was given to EHOs from LBTH and RBG. LBN were unable to attend but sent feedback at a later date. The consultation was undertaken with a view to agreeing Statements of Common Ground. Many of the major queries were related to assumptions in the traffic model which were answered by TfL's traffic team.

6.3.17 LBN noted that the proposed methodology seemed to presume that change in pollutant concentrations can only be significant if the Limit Values are exceeded. RBG also added that focussing on changes in PM_{10}/$PM_{2.5}$ would not be appropriate in the context of the Highways England's IAN 174/13 significance tables and that any assessment should present the actual change in concentration, not just the number of properties in each band. TfL explained that the impact of the Scheme on particulates will be reported in the ES. In order to comply with the NN NPS, the assessment will need to assess whether Scheme impacts can be considered significant; this will be based on published guidance in Highways England's IAN 174/13. There are legal thresholds for both PM_{10} and $PM_{2.5}$ which are considered in the judgement of significance.

6.3.18 LBN also raised the issue of future year receptors and whether they would be included in the assessment. Where there is definitive information regarding the location of future receptors, it was agreed that these would be included in the air quality assessment.

6.3.19 RBG queried why the A205 South Circular road is not included in the assessment. It was explained that the air quality study area is defined by applying the DMRB traffic screening criteria (see paragraph 6.3.31), and that the change in traffic on the south circular did not meet any of the criteria.

6.3.20 LBTH queried why the AQ assessment proposed to use 2021 Defra estimates of background concentrations only (rather than a current year background which would assume no change in background concentration between present day and opening year). It was explained that any assessment would be undertaken in accordance with Highways England IAN 170/12v3 (Ref 6-25) which provides the method for adjusting the modelled results to ensure that consideration of monitoring trends and lack of reduction in roadside concentrations is accounted for in the method. IAN 170/12v3 has been issued to ensure that overly optimistic assumptions on rates of improvements in concentrations are not used in the modelling process and to determine whether the Scheme impacts are significant. This is explained further in paragraphs 6.3.65 and 6.3.66.

Construction Assessment Methodology

6.3.21 The construction assessment has not been covered in the PEIR but will be addressed during in the ES submitted with the DCO application. The assessment will be undertaken in accordance with the Supplementary Planning Guidance as described in Table 6-2. The assessment will be undertaken in accordance with the IAQM guidance (*Guidance on the assessment of dust from demolition and construction (February 2014)).*

Operational Assessment Methodology

6.3.22 The air quality assessment for the PEIR has been completed in general accordance with guidance HA207/07 Volume 11, Section 3, Part 1 of the Design Manual for Roads and Bridges (DMRB) (Highway Agency (now Highways England), 2007) (Ref 6-6) and the associated Interim Advice Notes (IAN).

6.3.23 The relevant guidance documents are listed below:

- HA207/07 Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1, May 2007;
- Local Air Quality Management Technical Guidance LAQM.TG(09);IAN 170/12 v3 Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality, November 2013 (or latest update available at the time of the assessment), the document is accompanied by an excel-based tool as (available on request from Highways England) which is used to calculate and apply the ‘gap factor’ at specific receptors, see paragraphs 6.3.65 and 6.3.66 for more detail

- IAN 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07), June 2013 (or latest update available at the time of the assessment);

- IAN 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07), June 2013 (or latest update available at the time of the assessment);

6.3.24 The guidance (specifically DMRB) requires a number of different air quality assessments to be undertaken including a localised assessment (predicting concentrations of pollutants for comparison against the AQS objectives at sensitive receptors e.g. residential, schools and ecological sites, with and without the Scheme), a regional assessment (change in emissions as a result of the Scheme including carbon) and a WebTAG assessment (overall change in exposure as a result of the Scheme).

6.3.25 The localised assessment compares current and predicted air quality concentrations against the AQS objectives as presented in Table 1-5. To determine whether the Scheme will have a significant impact on air quality the local assessment results are utilised. Therefore for the purpose of the PEIR, the assessment has focused on the localised assessment. The regional and WebTAG assessments will be presented in the ES.

6.3.26 The localised results are also used to assess whether the Scheme is likely to affect compliance with the EU Directive on ambient air quality. The assessment utilises information provided by the Department for Environment, Food and Rural Affairs (Defra) to determine whether compliance with the EU Limit Values will be affected by the Scheme.

Localised Assessment

6.3.27 To undertake the local air quality assessment concentrations of nitrogen dioxide (NO_2), particulate matter less than 10 microns (PM_{10}), and particulate matter less than 2.5 microns ($PM_{2.5}$) have been predicted using a detailed dispersion model for the following scenarios:

- Base Year 2012 – The base year scenario is modelled to characterise the Baseline air quality environment (identify the areas where there are current exceedances of the AQS objectives) and for the purposes of model verification (the comparison of observed 2012 concentrations with modelled 2012 concentrations, the verification approach is explained in Appendix 6.A)

- Reference Case 2021 (predicted future Baseline air quality environment in scheme opening year 2021 without the Scheme)
- Assessed Case 2021 - Opening Year (predicted environment in 2021 with the Scheme in operation with user charges).

6.3.28 In order to undertake the modelling, detailed traffic data was obtained for the base year, reference case and assessed case year.

6.3.29 The year 2021 has been used to represent the represents the earliest anticipated opening year of the Scheme. However it is possible that the Scheme may not be operational until 2023. It is however likely that 2021 will be worst-case in terms of air quality impacts (both background concentrations and emissions from newer (Euro 6/VI) vehicles are expected to improve air quality over time as a greater number of low emission vehicles are introduced into the fleet).

6.3.30 The study area for the localised air quality assessment is defined using the traffic change-based criteria defined in DMRB. The assessed case 2021 traffic scenarios have been compared to the reference case 2021 traffic scenario. Roads that meet the criteria are defined as ‘affected roads’, all of which together comprise the affected road network (ARN). Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at those sensitive receptors located within 200m of these roads. Concentrations have been modelled in the Base Year (2012, existing Baseline), reference case (2021 future Baseline) and assessed case (2021 opening year) to determine the Scheme impacts.

6.3.31 The traffic change criteria set out in HA207/07 Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 1, have been used to define the ARN for the localised air quality assessment. The DMRB traffic change criteria are is as follows:

- Road alignment will change by 5m or more, or
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more, or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more, or
- Daily average speed will change by 10 km/hr or more, or
- Peak hour speed will change by 20 km/hr or more.
- Roads which do not meet any of the localised DMRB criteria as a result of the Scheme are therefore scoped out of the assessment. The study area for

the Scheme is presented in Drawings 6.1A-D. The ARN is reasonably extensive for the assessed scenario. The following areas are affected (Drawings 6.1A-D):

- A13 between Poplar and the A1306 interchange at Dagenham;
- A12 East Cross route between Blackwall Tunnel and the junction with A106 at Hackney Wick;
- A1261/1203 between Lower Lea Crossing and western end of Limehouse Link;
- A1020/A1011 between Silvertown and Beckton;
- A112 south of A13 in Canning Town;
- A102 between Blackwall Tunnel and Kidbrooke;
- A2 from Kidbrooke to A2/A220 interchange at Bexley;
- A282 Dartford Crossing;
- A small section of the B207 in New Cross Gate;
- Blackwall Tunnel (both directions); and
- Silvertown Tunnel and new supporting infrastructure.

6.3.32 Worst-case receptors (receptors which are likely to experience the highest pollutant concentrations and largest change in concentrations as a result of the Scheme) within 200m of the ARN were modelled. Although the modelled worst case receptors are not exhaustive, they have provided a representative indication of the likely impacts of the Scheme across the affected network at those locations which are the most sensitive to changes in traffic. They have also been used to determine whether the Scheme is likely to affect compliance with the EU Directive in accordance with IAN 175/13.

Determining Significance

6.3.33 The National Policy Statement for National Networks (NPS NN) requires that air quality effects that are both significant in terms of Environmental Impact Assessment (EIA) and in terms of compliance with EU Directive 2008/50/EC on ambient air quality are assessed. This will determine whether the Scheme effects require mitigation beyond that which is embedded in the design and will also guide the decision maker in relation to whether the Scheme should be granted development consent; the key test is described in paragraph 5.12 and 5.13 of the NPS NN;

6.3.34 Paragraph 5.12 “The Secretary of State must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and / or where they lead to a deterioration in air quality in a zone/agglomeration.”

6.3.35 Paragraph 5.13 “The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the Scheme will:

- result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or
- affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.”

6.3.36 Highways England, IAN 174/13 provides the advice that should be followed when using DMRB to determine whether the Scheme’s impacts are significant and therefore this advice will be followed for the Scheme. The guidance provides the framework and methodology for determining whether an impact is significant. Should a significant impact be triggered that cannot be mitigated the decision maker needs to give substantial weight to air quality impacts when determining whether the Scheme should be granted consent. The IAN was written in order to determine the significance of air quality effects and hence answer whether a significant impact is triggered for the purposes of Paragraph 5.12 of the NN NPS.

6.3.37 The air quality assessment uses the modelled results from the localised assessment and to inform the judgement on significance. Those receptors which are predicted to exceed the AQS Objectives/EU Limit Values in the opening year are used to inform the judgement of significance. The change in air pollutant concentrations measured at these receptors is relevant to the determination whether the Scheme impacts are significant.

6.3.38 To determine whether Paragraph 5.13 of the NN NPS is triggered, a compliance risk assessment must be completed and is discussed later in the chapter.

6.3.39 It must be reiterated that a definitive judgement on significance cannot be made without modelling all receptors which exceed the AQS objective in the study area (based on the Scheme changes in traffic within the ARN). The air quality assessment that has been presented in this report is based on the results from selected worst-case receptors and therefore provides an overview of the

Scheme's impacts on local air quality. A definitive judgement on the significance of impacts on local air quality will be made in the ES when all receptors which exceed the AQS objectives in the Scheme opening year have been modelled. The findings of the ES will need to fully satisfy the requirements detailed in paragraphs 5.12 and 5.13 of the NPS NN.

6.3.40 Table 6-3 presents the magnitude of change criteria presented in the IAN, and can be applied to annual average NO_2 and PM_{10} concentrations.

Table 6-3 Magnitude of Change Criteria (Highway England IAN 174/13)

Magnitude of Change in Concentration	Value of Change in Annual Average NO_2 and PM_{10}
Large (>4)	Greater than full Measure of Uncertainty (MoU) value of 10% of the air quality objective (4µg/m³).
Medium (>2 to 4)	Greater than half of the MoU (2µg/m³), but less than the full MoU (4µg/m³) of 10% of the air quality objective.
Small (>0.4 to 2)	More than 1% of objective (0.4µg/m³) and less than half of the MoU i.e. 5% (2µg/m³). The full MoU is 10% of the air quality objective (4µg/m³).
Imperceptible (≤ 0.4)	Less than or equal to 1% of objective (0.4µg/m³).

6.3.41 The results from the air quality model at receptors are used to populate Table 6-4 to inform the overall significance of the Scheme affecting air quality. Only receptors which exceed the AQS Objective (annual mean of 40µg/m³ for NO_2 and PM_{10}) in either the Reference Case or the Assessed Case scenarios are used to inform significance. The larger the change, the more certainty there is that there would be an impact on air quality attributable to the operation as a result of the Scheme. Following the DMRB methodology there will still be an element of residual uncertainties, referred to in the IAN as the Measure of Uncertainty (MoU). This is due to the inherent uncertainty in air quality monitoring, modelling and the traffic data used in the air quality assessment.

6.3.42 Where the differences in concentrations are less than 1% of the air quality threshold (e.g. less than 0.4µg/m³ for annual average NO_2), then the change at these receptors is considered to be negligible, and are scoped out of the judgement on significance.

6.3.43 Any changes in concentrations above the threshold of imperceptibility are assigned to one of the six categories presented in Table 6-4. The total numbers of receptors are then aggregated, in order to calculate the number of receptors in each of the six categories.

6.3.44 Table 6-4 will be populated once the assessment of all receptors which exceed the AQS objective for annual mean NO_2 have been modelled and will therefore be included in the significance calculation. This will be undertaken as part of the ES.

6.3.45 The IAN provides guidelines on the number of receptors for each of the magnitude of change categories that might result in a significant effect, as presented in Table 6-4. These are guideline values only, and are to be used to inform professional judgement in determining whether the Scheme would generate significant air quality effects.

Table 6-4 Guideline to Number of Properties Constituting a Significant Effect (Highways England IAN 174/13)

Magnitude of Change in Annual Average NO_2 or PM_{10} (µg/m³)	**Number of Receptors with:**	
	Worsening of air quality objective already above objective or creation of a new exceedence	**Improvement of an air quality objective already above objective or the removal of an existing exceedence**
Large (>4)	1 to 10	1 to 10
Medium (>2)	10 to 30	10 to 30
Small (>0.4)	30 to 60	30 to 60

6.3.46 Where the number of receptors fall below the guideline bands to inform significance, the Scheme is deemed not to have a significant impact e.g. 20 small worsenings would not be classed as significant. If the number of receptors affected is greater than the upper guideline bands (60 Small, 30 Medium and 10 Large) then the Scheme is more likely to have a significant impact on air quality. Schemes which affect receptors within the guideline bands require justification to determine whether the Scheme is significant.

Compliance with the EU Directive Ambient Air Quality

6.3.47 IAN 175/13 provides the guidance that should be followed to determine whether the test in paragraph 5.13 of the NPS NN is met (as described in paragraph 6.3.35).

6.3.48 Defra assesses and annually reports on the status of air quality in the UK, by reference to the Limit Values for each pollutant, to the European Commission in accordance with EU Directive (2008/50/EC). For the purposes of their assessment and reporting, the UK is divided in to 43 zones and agglomerations (hereafter referred to as zones). The main pollutants of concern with respect to compliance are NO_2 and PM_{10}.

6.3.49 The assessment of compliance with the Directive is undertaken using both monitoring (Defra AURN Network) and modelling from Defra's Pollution Climate Mapping (PCM) model. To determine the study area for the compliance risk assessment, the localised assessment (the ARN) is compared with the PCM model network as modelled by Defra. Where the two networks intersect is known as the compliance risk road network (CRRN) and forms the basis of the assessment of compliance risk.

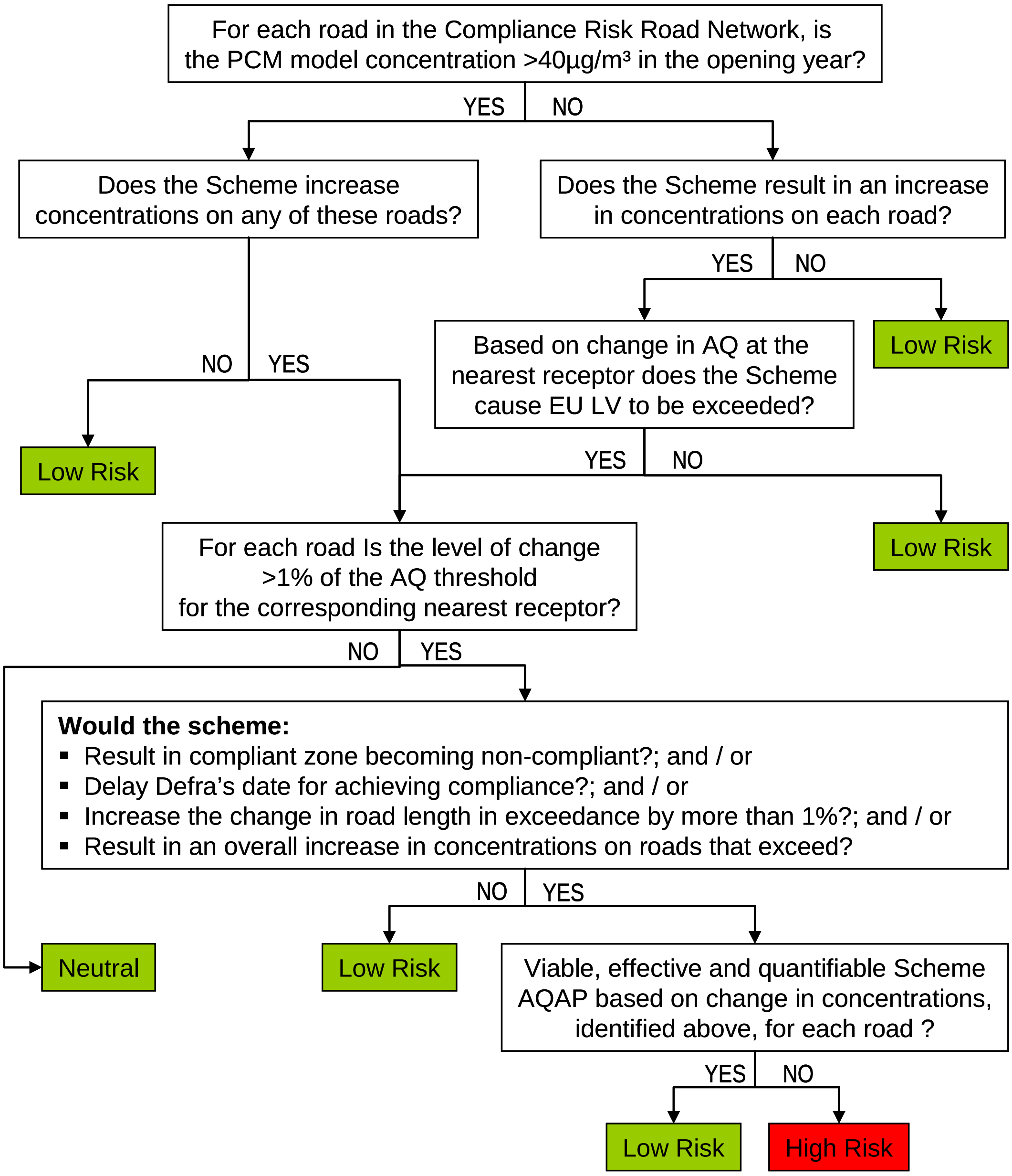
6.3.50 Defra utilises the PCM model to report for the purposes of compliance with the EU Directive 2008/50/EC. The model provides concentrations for each link in a number of years in five years intervals. The current compliance risk road network has modelled concentrations for 2011, 2015, 2020, 2025 and 2030.

6.3.51 The impact of the Scheme (i.e. the change in concentrations at receptors) on compliance is undertaken in accordance with IAN 175/13, whereby the modelled concentrations in the Defra PCM model for the opening year of the Scheme are utilised to gauge which roads are at risk of a compliance breach.

6.3.52 As the opening assessed year of the Scheme is 2021, the year falls between two modelled years modelled by Defra (2020 and 2025); an equivalent 2021 PCM concentration is interpolated. This is calculated assuming a linear drop off in pollutant concentration between 2020 and 2025 (as required in IAN 175/13).

6.3.53 To determine the compliance risk of the Scheme the IAN provides the following flow chart presented below as Figure 6-1.

Figure 6-1 Compliance Risk Assessment Flow Chart



6.3.54 If the Scheme is assessed as having a high risk of non-compliance, the IAN provides guidance on the production of Scheme Air Quality Action Plans (SAQAPs) containing actions designed to further mitigate Scheme impacts and so reduce the risk of non-compliance.

6.3.55 Defra has been required by the Supreme Court to update its air quality action plans before the end of 2015 (Ref 6-5), and these plans have now been published for consultation. For the purpose of the PEIR the most recent data issued has been used, any updated information that is published following the consultation will be included in the compliance risk assessment within the ES.

Air Quality Modelling

6.3.56 The ADMS(Atmospheric Dispersion Modelling System)-Roads model (version 3.4.2) has been used to predict the Scheme impacts in the Base Year and Scheme opening assessed year (both for the reference and assessed cases). The extent of the modelled roads is shown in Drawing 6-2 for the base year scenario, Drawing 6-3 for the reference case scenario and Drawing 6-4 for the assessed case scenario. A number of inputs are required to undertake the air quality modelling these are;

- Traffic Data;
- Emission Factors;
- NO_x to NO_2 Conversion;
- Meteorological Data;
- Background Pollutant Concentrations; and
- Future Assumptions based on Trends.

6.3.57 These inputs are described in detail in the following section.

Traffic Data

6.3.58 Traffic data used in the assessment were provided by the traffic model developed by Transport for London's (TfL) traffic team. The raw traffic data derived from the model was converted into the format required for the air quality assessment.

6.3.59 The traffic data was provided in the following format:

- 24hr Annual Average Daily Traffic (AADT) flows (average 24 hour total traffic flow in a year) for the Base Year 2012 and the reference/assessed cases (2021). Average speeds and percentage Heavy Duty Vehicles were also supplied for each of the modelled road links.
- In addition to the AADT, the diurnal time specific traffic data was provided for, the morning peak (AM, 06:00-10:00), inter peak (IP, 10:00-16:00), evening peak (PM, 16:00-19:00) and off-peak (OP, 19:00-06:00) periods. Traffic data in the base year and reference case followed this format. For the assessed case only, the OP period was split into two separate periods – OP1 (19:00-22:00) and OP2 (22:00-06:00). This was to better reflect the response of traffic to the proposed Silvertown Tunnel charging regime in the evening

hours as the Tunnel will be charged until 22:00. Between 22:00 and 06:00 the tunnel will be free to use. Therefore the base and reference case were modelled using four periods and the assessed case was modelled using five periods.

- Splitting the traffic data into periods with differing traffic flow allows the modeller to create a diurnal time based emissions profile, i.e. time-specific emission rates that vary through the day in step with traffic flows. This is a more representative approach than modelling a single daily emission rate from an AADT flow. Each of the digitised roads is prescribed specific emission rates for each of the AM, IP, PM and OP (OP1 and OP2 in the assessed case) periods. This ensures that the variability of emissions (particularly during congested periods) are considered in the air quality modelling. The same profile used for a weekday is applied to the weekend.

Emission Factors

- The latest Emissions Factors Toolkit (EFT) (Version 6.0.2, July 2014) released by Defra has been used to calculate vehicle emissions based on vehicle fleet composition, traffic speeds and road type for the different time profiles. The EFT allows the user to select geographically specific fleet composition breakdowns for the Central, Inner and Outer areas of London. The emissions rates were calculated using emissions projections for the 2012 base year, and 2021 opening year scenarios.

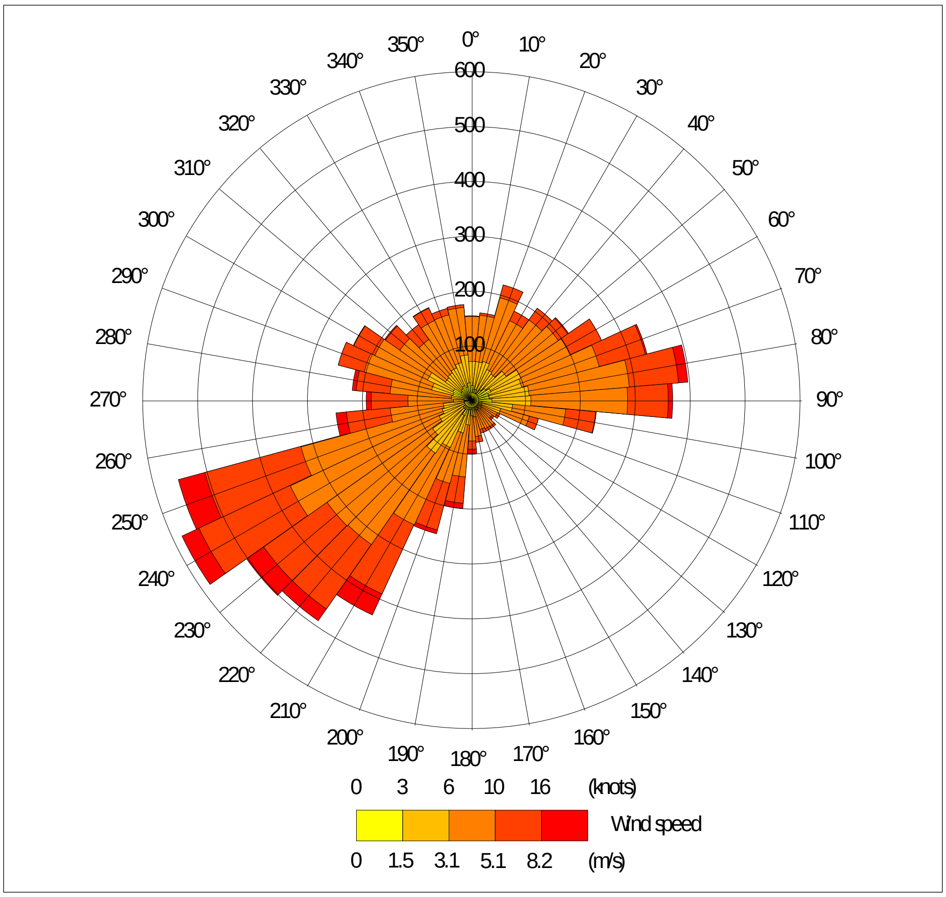
NO_x to NO_2 conversion

- In accordance with LAQM.(TG(09)) (Ref 6-26) all modelled road-based concentrations of NO_x have been converted to annual mean NO_2 using the 'NO_x to NO_2' calculator (Version 4.1, released June 2014). The traffic mix and local authority used for the conversion from NO_x to NO_2 were selected depending on the modelled receptor and diffusion tube locations.

Meteorological Data

- Meteorological data from London City Airport, which is the nearest suitable data source for 2012, has been used in the assessment. This year corresponds to the availability of traffic data and actual monitoring data, and allows for verification of modelled outputs with the meteorological data for 2012. The wind rose for London City Airport is presented in Figure 6-2. The predominant wind direction is from the south west and is associated with the highest wind speeds.

Figure 6-2 Wind Rose for London City Airport 2012



<u>Background Pollutant Concentrations</u>

6.3.60 Predictions of total pollutant concentrations include contributions from local emissions sources (such as roads, chimney-stacks, etc.) and local background concentrations. In many situations, the background contribution may represent a significant or dominant proportion of these concentrations. Background concentrations for regulated pollutants are expected to decline in future years (although not as steeply as once anticipated) as a result of Government and EU policies and legislation to reduce pollution emissions.

6.3.61 In order to establish a prediction of total air quality, road source contributions are combined with a background concentration. It is therefore important that background air pollution contributions from sites which are selected have not been influenced by the road sources under consideration.

6.3.62 LAQM.TG (09) (Defra, 2009) recommends the use of empirically-derived national background estimates available from the Defra website, which provide estimated background pollutant concentrations for each 1km x 1km grid square in the UK.

6.3.63 In all areas, background concentrations for both modelled receptors and monitoring points were taken from the corresponding 1km x 1km grid square. Given the size of the modelled area this was considered to be a more realistic approach than taking one background concentration for the whole study area.

6.3.64 As the background NO_x and PM_{10} maps provide data for the individual pollutant sectors (e.g. motorway, trunk A-roads, primary A-roads, minor roads and industry); the components relating to in-grid square road traffic have been removed for those road types being explicitly modelled, to avoid double counting of road emissions. The NO_x contribution of the in-grid road sectors were removed from the total NO_x background concentrations. The adjusted total NO_x background concentration was then converted to NO_2 for use in the assessment. This was undertaken using the NO_2 Adjustment for NOx Sector Removal tool (v4, June 2014). This calculator was used to adjust the 2012 and 2021 background NO_2 concentrations.

<u>Future Assumptions on Trends in Emissions</u>

6.3.65 A report produced on behalf of Defra (Ref 6-27) considered NO_2 monitoring data from across the UK and suggests that reductions in concentrations have slowed in recent years. Therefore, it is now agreed amongst many air quality professionals that future predictions of NO_2 concentrations may be underestimated. Defra updated the air quality tools in 2014 (new EFT, background maps, NO_x/ NO_2 converter) with the aim of closing this ‘gap’ between forecast and monitored NO_2 trends. However, it is considered that future NO_2 levels based on these updated tools are still likely to underestimate future concentrations. In response to this Highways England issued advice in IAN 170/12v3 (November 2013) wherein a long-term trend (LTT) gap analysis has been carried out for modelled NO_2.

6.3.66 This LTT NO_2 gap analysis is based on adjustment of 2021 NO_2 modelled concentrations for both the without Scheme (known in this assessment as the reference case) and with Scheme (in this assessment known as the assessed case) scenarios using 2012 modelled Base Year NO_2 concentrations and an alternative projection factor (based on a projected Base Year, which is the Base Year traffic data with opening year 2021 emissions and backgrounds) as outlined in IAN 170/12v3. Highways England has provided a gap analysis tool (LTTE6v1.1) to assist with the calculation. This calculator is available on request from Highways England. The basis of the tool is that no improvement can be attributed from vehicles other than the new Euro 6/VI vehicles that enter the fleet. This is as a result of the evidence that indicates that previous Euro standards have not performed to their standard i.e. reductions at roadside analysers concentrations have been slower than anticipated.

6.3.67 As discussed in paragraphs 6.3.2 to 6.3.20, many of the stakeholders during the consultation raised the adequacy of future assumptions of air quality trends and background concentrations embedded in Defra's suite of tools. This is an important issue given that the determination of the significance of the Scheme's impacts will be dependent on the concentrations predicted in the future. The main concern raised by stakeholders was that future projections of NO_x/NO_2 purely based on Defra's predictions are likely to be optimistic and the stakeholders questioned whether the LAEI could be used. The LAEI is an emissions inventory and detailed model for all air pollutant sources in London. It provides concentrations at a 10m resolution across London. It does not however breakdown the various component contributions (i.e. the proportion of NO_x/NO_2 emitted from road and non-road sources) which would be needed if the traffic generated by the traffic model were to replace the road component of the emissions and hence predictions in the LAEI. Therefore it was decided that using the Defra tools and associated guidance would be more appropriate.

6.3.68 The guidance issued by Highways England corrects for the optimism in the projections and therefore it was proposed that this guidance would be followed.

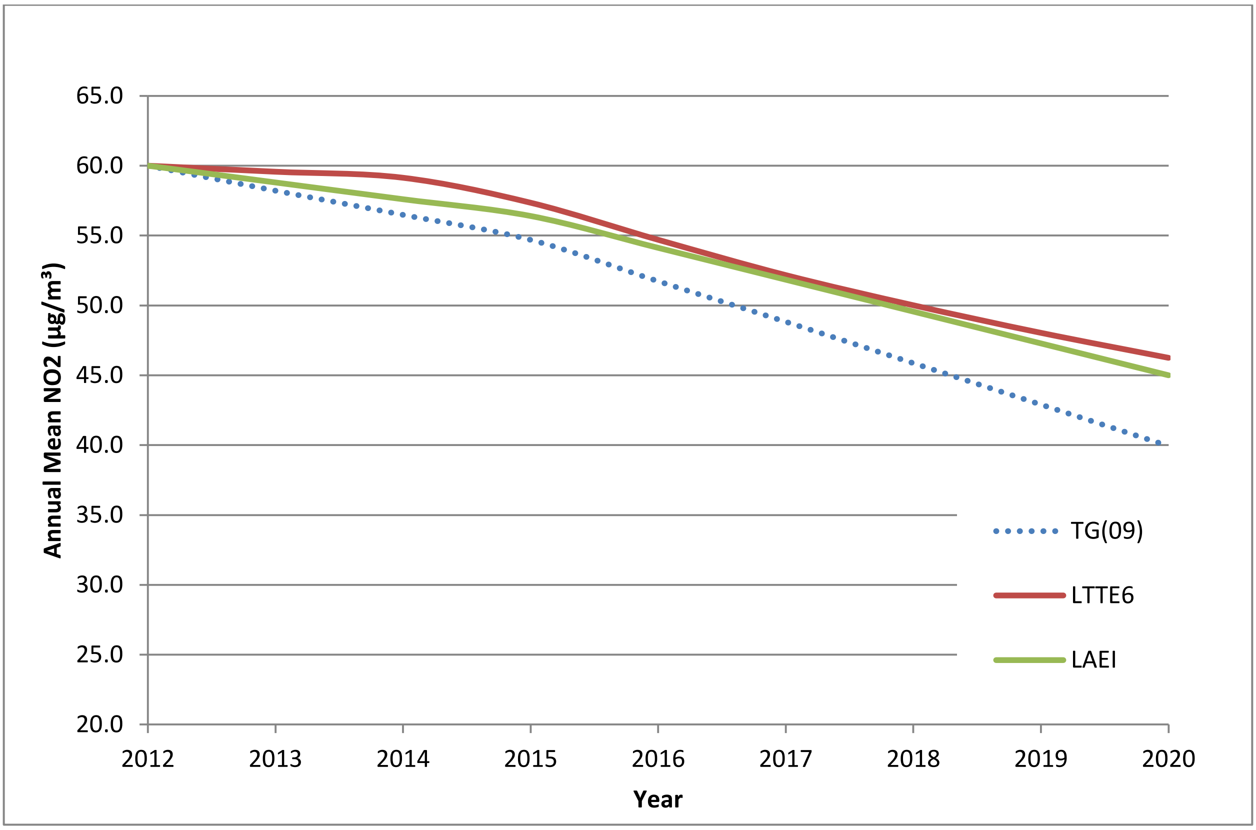
6.3.69 Given that the IAN 170/12v3 guidance produced by Highways England was not explicitly developed for the London environment (as the traffic mix will be different in London), analysis was undertaken to determine whether it would be applicable appropriate for use in the Scheme air quality assessment.

6.3.70 A number of sources of future projections of NO_2 were analysed in the sensitivity test:

- latest projections from Box 2.1 of Defra LAQM (TG(09)) for inner London,
- projections from IAN 170/12v3 (which assumes Euro6/VI benefits after 2015), known as LTTE6;
- projections from the LAEI (Base year 2010) (2012, 2015 and 2020) for modelled concentrations next to approximately 20 roads and derived roadside projections.; and

6.3.71 The three sets of projections stated above were plotted onto a graph assuming a starting 2012 NO_2 concentration of 60µg/m³ (which is a nominal value to represent a kerbside measured NO_2 concentration). This is presented as Figure 6-3.

Figure 6-3 Projected trends in NO_2 embedded in LAQM TG(09), LTTE6 and LAEI methodologies



6.3.72 Figure 6-3 shows that LAEI projections and the projections in LTT_{E6} (HA 170/12v3) are similar, with LTT_{E6} representing the least optimistic projection curve (2.6% higher than LAEI in 2021).

6.3.73 Therefore, utilising Defra tools and IAN 170/12v3 projection is likely to produce a similar projection to what would be predicted in the LAEI. The Defra background maps and methodology in IAN 170/12v3 has therefore been utilised in the Silvertown assessment.

Model Verification

6.3.74 A key part of the modelling process is the model verification. Modelled pollutant concentrations have been verified against the Baseline air quality monitoring results collected from local authorities and the Scheme specific monitoring in the study area. This is to determine whether the model is systematically under or over-predicting emission levels so that the results can be adjusted, this ensures that the modelled output better represents observed concentrations. The model verification has been undertaken in accordance with the principles outlined in Annex 3 of LAQM (TG (09)). In summary the model tended to under-predict concentrations of road NO_x, therefore eleven geographical verification zones were created to adjust the modelled output. A detailed verification procedure used in this assessment is presented in Appendix 6.A.

Defining Assessment Pollutants and Scheme Receptors

Air Quality Criteria

6.3.75 For the pollutants of concern (NO_2,PM_{10} and $PM_{2.5}$), there are two sets of ambient air quality criteria for the protection of public health, namely those set by the EU and transposed in to UK law by The Air Quality Standards Regulations 2010 and those implementing the UK National Air Quality Strategy (AQS).

6.3.76 The criteria set out in the AQS include standards and objectives for local authorities to work towards achieving. These apply in locations with relevant public exposure which are defined in the Defra’s technical guidance document LAQM.TG(09).

6.3.77 The standards set by the EU are legally binding, mandatory limit values (LV) requiring national Government compliance. Failure in compliance (for a compliance agglomeration zone) can lead to infraction proceedings by the EU against the Member State; the UK is currently the subject of infraction proceedings.

6.3.78 Local air quality criteria relevant to the air quality assessment for the Scheme are summarised in Table 6-7.

Table 1-5 Relevant Local Air Quality Criteria

Pollutant	Criteria	Compliance Date	
		AQS Objective	EU Limit Value
NO_2	Hourly average concentration should not exceed 200 µg/m^3 more than 18 times a year	31 December 2005	1 January 2010
	Annual mean concentration should not exceed 40 µg/m^3	31 December 2005	1 January 2010
PM_{10}	24-hour mean concentration should not exceed 50 µg/m^3 more than 35 times a year	31 December 2004	1 January 2005
	Annual mean concentration should not exceed 40 µg/m^3	31 December 2004	1 January 2005
$PM_{2.5\ (a)}$	Annual Mean concentrations should not exceed 25µg/m^3	2020	

6.3.79 The $PM_{2.5}$ objective, which is to be met by 2020, is not in the Regulations and there is no requirement for Local Authorities to meet it.

6.3.80 The health impacts of the pollutants which are modelled in the assessment are summarised in Table 6-6.

Table 6-6 The Health Effects of assessed air pollutants

Pollutant	Main Health Effects
Nitrogen Dioxide	Short-term exposure to high concentrations may cause inflammation of respiratory airways. Long-term exposure may affect lung function and enhance responses to allergens in sensitised individuals. Asthmatics are particularly at risk according Committee On the Medical Effects of Air Pollution (COMEAP) (Ref 6-28).
Particulate Matter <10µm	Particulate matter can affected human health. The available evidence as detailed by COMEAP (Ref 6-29) suggests that it is the fine components of PM_{10}, which have an aerodynamic diameter of 10 µm or less and are formed by combustion, that are the main cause of the harmful effects of particulate matter. Particles cause the most serious health problems among those susceptible groups with pre-existing lung or heart disease

Pollutant	Main Health Effects
	and/or the elderly and children. There is evidence that short- and long-term exposure to particulate matter cause respiratory and cardiovascular illness and even death. It is likely that the most severe effects on health are caused by exposure to particles over long periods of time.
Particulate Matter <2.5µm	Inhalation of particulate pollution can have adverse health impacts, and there is understood to be no safe threshold below which no adverse effects would be anticipated. The biggest impact of particulate air pollution on public health is understood to be from long-term exposure to PM2.5, which increases the age-specific mortality risk, particularly from cardiovascular causes. Several plausible mechanisms for this effect on mortality have been proposed, although it is not yet clear which is the most important. Exposure to high concentrations of PM (e.g. during short-term pollution episodes) can also exacerbate lung and heart conditions, significantly affecting quality of life, and increase deaths and hospital admissions. Children, the elderly and those with predisposed respiratory and cardiovascular disease, are known to be more susceptible to the health impacts from air pollution. Potential mechanisms by which air pollution could cause cardiovascular effects are described in the COMEAP report on particulate matter.

<u>Receptors</u>

6.3.81 The air quality objectives only apply where members of the public are likely to be regularly present for the averaging time of the objective (i.e. where people will be exposed to pollutants). The annual mean objectives apply to all locations where members of the public might be regularly exposed; these include building façades of residential properties, schools, hospitals, care homes, etc. The 24 hour mean objective applies to all locations where the annual mean objective would apply, together with hotels and gardens of residential properties. The 1 hour mean objective also applies at these locations as well as at any outdoor location where a member of the public might reasonably be expected to stay for 1 hour or more, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

6.3.82 According to LAQM (TG(09)) measurements across the UK have shown that the 1-hour mean NO_2 objective is unlikely to be exceeded unless the annual mean NO_2 concentration is greater than 60µg/m³. Thus exceedences of

60µg/m³ as an annual mean NO_2 concentration are used as an indicator of potential exceedences of the 1-hour mean NO_2 objective.

6.3.83 Similarly, LAQM.TG(09) also provides a relationship between the annual mean PM_{10} concentration and number of exceedences of the 24-hour objective: those areas where the annual mean concentration is greater than 32µg/m³ were demonstrated to be at risk of exceeding the 24-hour objective. Thus exceedences of 32µg/m³ as an annual mean PM_{10} concentration are used as an indicator of potential exceedences of the 24 hour mean PM_{10} objective.

6.3.84 Receptors that are therefore potentially sensitive to changes in air quality are defined in DMRB HA207/07 as housing, schools, hospitals and designated species or habitats within a designated ecological site located within 200m of Scheme affected roads or construction sites.

Limitations and Assumptions

6.3.85 The PEIR provides the preliminary modelled results that representative worst-case receptors impacted by the Scheme. A full assessment in accordance with DMRB and associated IANs will be carried out which will include modelling all receptors which exceed the AQS Objectives.

6.3.86 Prior to TfL generating the traffic data for the assessment, Highways England issued guidance in the form of an IAN in relation to modelling of road Schemes (IAN 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3) (see Ref 6-1). This guidance could not be incorporated into the modelling undertaken for the PEIR but will be incorporated into the modelling for the ES. It is not anticipated that the incorporation of this advice will significantly affect the results of the modelling. However, this can only be confirmed when the updated modelling has been undertaken.

6.3.87 The construction assessment will be completed in the ES. However, it is not anticipated that the construction impacts will lead to a significant impact with the incorporation of best practice mitigation measures.

6.3.88 Whilst the data used in the assessment is the most recently published, it is understood that information issued by Defra in relation to EU compliance reporting is subject to change. The basis of the emission factors used in the Emission Factor Toolkit are updated from time to time as updated evidence emerges on emissions from sources such as vehicle emissions testing. Should the information be updated, this will be incorporated into the assessment for the ES.

6.3.89 A passive ventilation stack which vents a proportion (~50%) of in-tunnel emissions is included as part of the Scheme design. The PEIR assessment did not take into account the impact of the stack emissions. This will be included in the ES once the design and location of the stack is finalised. Whilst the impact of these changes at this stage cannot be quantified it is not anticipated that they would have a significant impact on the conclusions of the assessment.

6.4 Description of the Baseline Conditions

Existing Baseline

6.4.1 The existing Baseline comprises the existing air quality conditions in the area that is likely to be affected by the Scheme. A review of the existing Baseline was undertaken to establish an understanding of the Baseline air quality environment and to identify areas that are likely to be sensitive to changes in emissions as a result of the Scheme. Baseline information on air quality has been collected from the following sources:

- Online map and aerial photograph resources (https://maps.google.co.uk (Ref 6-30)), www.magic.gov.uk (Ref 6-31) and digital Ordnance Survey mapping);
- Defra UK Air website (http://uk-air.defra.gov.uk/) (Ref 6-32)
- Local Authorities' websites (LAQM documents);
- Local Authorities' Officers responsible for air quality;
- London Air Quality Network (http://www.londonair.org.uk) (Ref 6-33);
- Greater London website (http://data.london.gov.uk/datastore) (Ref 6-34) – London Atmospheric Emissions Inventory GIS files and Air Quality Focus Area data;
- Kent Air website (http://www.kentair.org.uk) (Ref 6-35)
- Essex Air website (http://www.essexair.org.uk/) (Ref 6-36);
- Transport for London's air quality team ;
- Scheme specific air quality monitoring;

6.4.2 The information acquired from the sources above is summarised the following sections.

Local Authority Monitoring Data

6.4.3 Monitoring data have been collected by local authorities using NO_2 diffusion tubes and continuous automatic monitoring. A summary of the year 2014 bias - adjusted results from diffusion tubes within the study area are shown in Table 6-7 for roadside (generally within 5m, but can be further depending on the road source) and background (greater than 50m from major sources of pollution) locations. Only the following tubes are included in the summary table:

- Tubes with greater than 75% data capture for 2014. LAQM (TG(09)) states that data capture rates of 75% or less should be treated with extreme caution, particularly when comparing the data against annual average AQS Objectives.
- Tubes within the local authorities covered by the study area.
- Tubes with verified coordinates.

Table 6-7 Bias adjusted annual mean NO_2 concentrations from diffusion tube sites in the study area

Local Authority	Annual Average Concentration 2014 (µg/m³) – Number of Tubes in Each Concentration Band				
	<20	>=20 to <30	>=30 to <40	>=40 to <50	>=50
Royal Borough of Greenwich	0	3	7	13	18
London Borough of Lewisham	0	4	14	5	9
London Borough of Redbridge	0	1	6	8	6
Dartford Borough Council	0	3	12	17	11
Thurrock Council	1	6	26	6	4
Waltham Forest	0	2	0	1	1

6.4.4 Table 6-7 shows that there were widespread exceedences of the annual mean NO_2 limit value (40µg/m³) across the study area in 2014, and that concentrations were above 50µg/m³ at multiple sites, which suggests that the hourly NO_2 objective could be exceeded at these sites. The conditions described are typical for a heavily urbanised environment in inner London.

Automatic Monitoring Sites

6.4.5 Annual mean NO_2 concentrations and the number of 1 hour exceedences of the AQS objectives, recorded by the roadside continuous monitoring stations within the study area, are shown in Table 6-8. Please note ”-“ denotes an occurrence where no ratified data was available, values in bold exceed the AQS objectives, values in red have less than a 75% data capture.

6.4.6 Table 6-8 shows the annual mean NO_2 concentration and the number of exceedences of the 1 hour mean AQS objective recorded from all continuous monitoring sites within the study area. The table shows that there are widespread exceedences of the annual mean NO_2 objective of 40 µg/m³ at multiple monitoring sites between the years 2012 and 2014. The monitoring sites located in the City of London recorded the highest number of exceedences of the 1 hour mean AQS objective (not to be exceeded more than 18 times per year) and the highest annual average NO_2 concentration, with the roadside sites (CT4 and CT6a) exceeding the objective in 2012-2014.

6.4.7 Annual mean PM_{10} concentrations and the number of 1 hour exceedences of the AQS objectives, recorded at the continuous automatic monitoring sites across the study area are shown in Table 6-9.

6.4.8 Table 6-9 shows that concentrations of PM_{10} were below annual mean objectives between 2012 and 2014 for all site locations with the exception of CT8-Upper Thames Street (City of London) where the concentration was 42 µg/m³ for 2013. The 24 hour AQS Objective (50µg/m³ 24 hour mean not to be exceeded more than 35 times per year) was exceeded by multiple sites between 2012 and 2014 within the London Borough of Barking and Dagenham, London Borough of Bexley, and The City of London.

6.4.9 Annual mean $PM_{2.5}$ concentrations recorded at the continuous automatic monitoring sites across the study area, are shown in Table 6-10. This shows that concentrations of $PM_{2.5}$ were below 20 µg/m³ between 2012 and 2014 for all site locations.

Table 6-8 Annual mean NO_2 (µg/m³) concentrations recorded by roadside continuous monitoring sites from local authorities within the study area

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
London Borough of Barking and Dagenham	Rush Green (Background)	551053	187233	27	0	74	27	0	90	25	1	88
	Scratton Farm (Background)	548043	183320	39	0	49	33	0	43	30	0	94
London Borough of Bexley	Belvedere (BX2) (Background)	549975	179064	27	0	90	26	0	90	27	0	98
	Belvedere West (BQ7)	548259	179473	25	0	90	24	0	90	23	0	98

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
	(Background)											
	Erith (BX4) (Industrial)	552234	177690	25	-	70	28	0	90	24	0	96
	Slade Green (BX1) (Background)	551860	176376	29	0	90	28	0	90	27	0	98
Dartford Borough Council	Bean Interchange RB (Roadside)	558622	172752	**55**	7	98	**43**	0	99	**51**	-	39
	St Clements RB	558525	1747	**56**	**26**	99	**53**	**21**	99	**61**	-	60

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
	(Roadside)		09									
	Town Centre RB (Roadside)	554117	173852	**43**	0	96	**49**	16	85	**44**	-	55
London Borough of Hackney	Hackney 6 (Old Street) (Roadside)	532945	182570	**64**	0	90	**63**	0	90	**67**	2	99
London Borough of Havering	HV1 Rainham (Roadside)	553250	182750	-	-	-	30	0	78	35	0	99
	HV3 Romford (Roadside)	551108	188257	35	0	71	33	0	76	-	-	-

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
London Borough of Lewisham	Catford (LW1) (Background)	537675	173689	**50**	2	90	**48**	3	90	**54**	0	99
	Loampit Vale (LW4) (Roadside)	537911	175838	**63**		45	**57**	**26**	90	**56**	5	78
	New Cross (LW2) (Roadside)	536241	176932	**50**	0	90	**51**	0	90	**42**	0	99
London Borough of Newham	Cam Road (Roadside)	538661	183969	**43**	0	90	**53**	0	24	-	-	-
	Wren Close (Backgroun	539889	181469	39	0	90	**42**	0	25	-	-	-

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
	d)											
Royal Borough of Greenwich	Blackheath Hill (GR7) (Roadside)	538141	176710	**48**	0	90	**48**	1	86	**44**	0	98
	Burrage Grove (GR10/GN0) (Roadside)	544084	178881	**45**	1	90	**45**	0	90	39	0	99
	Eltham (GR4) (Background)	543978	174655	22	0	90	21	0	90	20	0	65
	Falconwood (GB6)	544997	175098	**47**	**21**	90	**51**	11	90	**47**	11	88

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
	(Roadside)											
	Fiveways Sidcup Road (GN4) (Roadside)	543582	172653	**52**		88	**58**	7	90	**54**	2	97
	Millennium Village (GR12/GN2) (Roadside)	540169	178999	37	2	90	38	2	75	37	0	80
	Plumstead High St (GR13/GN3) (Roadside)	545560	178526	39		90	37	0	90	37	0	90
	Trafalgar Road (GR5)	538960	1779	**44**	0	90	**41**	0	90	38	5	98

Local Authority	Monitoring Station	x	y	Annual Average NO$_2$ Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO$_2$ Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO$_2$ Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
	(Roadside)		54									
	Westhorne Avenue (GR9) (Roadside)	541885	175016	**44**	0	90	**46**	4	90	**43**	2	97
	Woolwich Flyover (GR8) (Roadside)	540200	178367	**71**	**27**	90	**65**	8	90	**75**	**27**	99
London Borough of Redbridge	RB1 Perth Terrace, Ilford (Background)	544378	187656	37	0	90	35	1	90	35	0	36

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
	RB3 Fulwell Cross, Barkingside (Roadside)	544560	190408	**62**	1	24	-	-	-	-	-	-
	RB4 Gardener Close, Wanstead (Roadside)	540822	188371	**48**	8	90	**45**	1	90	**52**	0	37
	RB5 Grove Road, South Woodford (Roadside)	539910	190470	**55**	1	24	-	-	-	-	-	-
London Borough	Old Kent Road	534844	177515	**53**	6	80	**58**	6	90	**42**	1	38

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
of Southwark	(Roadside)											
	Elephant & Castle (Background)	531884	178835	-	-	-	**42**	0	85	37	0	93
The City of London	CT 6b Walbrook Wharf Roof (Background)	532528	180784	**92**	**63**	100	-	-	-	-	-	-
	CT1 Senator (Background)	532234	180894	**52**	2	72	-	-	-	-	-	-

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average NO_2 Concentration 2012 (µg/m³)**	**Exceedences of the Hourly Mean (200µg/m³)**	**Data Capture (%)**	**Annual Average NO_2 Concentration 2013 (µg/m³)**	**Exceedences of the Hourly Mean (200µg/m³)**	**Data Capture (%)**	**Annual Average NO_2 Concentration 2014 (µg/m³)**	**Exceedences of the Hourly Mean (200µg/m³)**	**Data Capture (%)**
	CT3 John Cass (Background)	533475	181179	**47**	0	97	**47**	0	98	**45**	0	99
	CT4 Beech St (Roadside)	532176	181862	**79**	**176**	100	**85**	**221**	96	**80**	**178**	99
	CT6a WW Foyer (Roadside)	532527	180789	**115**	**483**	96	**122**	**771**	98	**117**	**99**	21
London Borough of Tower Hamlets	Blackwall (TH4) (Roadside)	538290	181452	**62**	0	90	**58**	0	90	**59**	1	99
	Mile End Road (TH2)	535927	1822	**60**	2	90	**61**	1	90	**62**	1	99

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average NO_2 Concentration 2012 (µg/m^3)**	**Exceedences of the Hourly Mean (200µg/m^3)**	**Data Capture (%)**	**Annual Average NO_2 Concentration 2013 (µg/m^3)**	**Exceedences of the Hourly Mean (200µg/m^3)**	**Data Capture (%)**	**Annual Average NO_2 Concentration 2014 (µg/m^3)**	**Exceedences of the Hourly Mean (200µg/m^3)**	**Data Capture (%)**
	(Roadside)		21									
	Poplar (TH1) (Background)	537509	180867	33	0	90	33	0	49	-	-	-
	Victoria Park (TH5) (Background)	536487	184238	34		41	33	0	90	**44**	0	38
Thurrock Council	Calcutta Road Tilbury (TK4) (Roadside)	563900	176282	39	0	99	34	0	90	33	0	91

Local Authority	Monitoring Station	x	y	Annual Average NO_2 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)	Annual Average NO_2 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (200µg/m³)	Data Capture (%)
	London Road Purfleet (TK8 formerly TK2) (Roadside)	556698	177937	**63**	7	90	**63**	4	90	**62**	5	99
	Stanford-Le-Hope (TK3) (Roadside)	569356	182736	33	0	93	28	0	90	26	0	99
	TH1 - London Road Grays (TK1) (Background)	560900	177700	28	0	90	27	0	90	27	0	98

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average NO_2 Concentration 2012 (µg/m³)**	**Exceedences of the Hourly Mean (200µg/m³)**	**Data Capture (%)**	**Annual Average NO_2 Concentration 2013 (µg/m³)**	**Exceedences of the Hourly Mean (200µg/m³)**	**Data Capture (%)**	**Annual Average NO_2 Concentration 2014 (µg/m³)**	**Exceedences of the Hourly Mean (200µg/m³)**	**Data Capture (%)**
London Borough of Waltham Forest	WL1 Dawlish Road (Background)	538380	186717	-	-	-	36	2	90	-	-	-
	WL4 Crooked Billet (Roadside)	537468	191071	-	-	-	**68**	11	90	-	-	-
	WL5 Ruckholt Close (Roadside)	537804	186025	-	-	-	28	0	90	-	-	-

Table 6-9 Annual mean PM_{10} (µg/m³) concentrations recorded by continuous monitoring sites from local authorities within the study area

Local Authority	Monitoring Station	x	y	Annual Average PM_{10} Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)	Annual Average PM_{10} Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)	Annual Average PM_{10} Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)
London Borough of Barking and Dagenham	Scratton Farm	548043	183320	20	**43**	49	18	0	22	-	-	-
London Borough of Bexley	Belvedere (BX2)	549975	179064	20	12	>90	21	8	>90	-	-	-
	Belvedere FDMS (BX0)	549975	179064	19	12	>90	19	8	>90	17	8	99
	Belvedere West (BQ7)	548259	179473	19	8	>90	20	5	>90	-	-	-
	Belvedere West FDMS	54825	17947	16	7	>90	18	3	89	18	8	83

Local Authority	Monitoring Station	x	y	Annual Average PM10 Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)	Annual Average PM10 Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)	Annual Average PM10 Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)
	(BQ8)	9	3									
	Erith (BX4)	552234	177690	27	**38**	>90	28	33	>90	-	-	-
	Falconwood (GB6)	544997	175098	-	-	-	28	28	72	-	-	-
	Manor Road West Gravimetric (BQ5)	552234	177690	27	**39**	>90	34	**52**	>90	29	35	79
	Slade Green (BX1)	551860	176376	19	5	>90	16	0	>90	-	-	-
	Manor Road East (BQ6)	552239	177691	-	-	-	-	-	-	28	28	78

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average PM10 Concentration 2012 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM10 Concentration 2013 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM10 Concentration 2014 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**
Dartford Borough Council	Bean Interchange RD	558622	172752	21	9	97	33	5	81	29	-	53
	St Clements RD	558525	174709	22	8	97	26	-	98	32	-	63
	Town Centre RD	554117	173852	24	16	95	29	22	95	31	-	65
London Borough of Hackney	Hackney 6 (HK6) - Old Street	532945	182570	28	16	93	29	19	>90	-	-	-
London Borough of Havering	HV3 Romford	551108	188257	23	11	>90	24	6	82	26	12	79
London	Loampit	53791	17583	-	-	-	28	19	>90	-	-	-

Local Authority	Monitoring Station	x	y	Annual Average PM_{10} Concentration 2012 (µg/m^3)	Exceedences of the Hourly Mean (50µg/m^3)	Data Capture (%)	Annual Average PM_{10} Concentration 2013 (µg/m^3)	Exceedences of the Hourly Mean (50µg/m^3)	Data Capture (%)	Annual Average PM_{10} Concentration 2014 (µg/m^3)	Exceedences of the Hourly Mean (50µg/m^3)	Data Capture (%)
Borough of Lewisham	Vale (LW4)	1	8									
	Mercury Way (LW3)	535806	177612	22	20	-	24	13	>90	-	-	-
	New Cross (LW2)	536241	176932	-	-	-	23	15	>90	23	14	80
London Borough of Newham	Cam Road	538661	183969	-	-	-	33	14	25	-	-	-
Royal Borough of Greenwich	Thamesmead (BX3)	547323	181231	-	-	-	-	-	-	-	-	-
	Blackheath Hill (GR7)	538141	176710	28	26	>90	30	29	86	27	19	93
	Burrage Grove	54408	17888	27	28	>90	28	18	64	23	17	69

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average PM$_{10}$ Concentration 2012 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM$_{10}$ Concentration 2013 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM$_{10}$ Concentration 2014 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**
	(GR10/GN0)	4	1									
	Eltham (GR4)	543978	174655	20	9	>90	20	4	>90	19	10	92
	Falconwood (GB6)	544997	175098	26	27	>90	30	28	71	-	-	-
	Millennium Village (GR12/GN2)	540169	178999	23	20	>90	26	20	76	26	17	73
	Trafalgar Road (GR5)	538960	177954	23	16	>90	23	8	>90	-	-	-
	Westhorne Avenue	541879	175016	20	16	>90	24	17	>90	25	19	93

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average PM$_{10}$ Concentration 2012 (µg/m^3)**	**Exceedences of the Hourly Mean (50µg/m^3)**	**Data Capture (%)**	**Annual Average PM$_{10}$ Concentration 2013 (µg/m^3)**	**Exceedences of the Hourly Mean (50µg/m^3)**	**Data Capture (%)**	**Annual Average PM$_{10}$ Concentration 2014 (µg/m^3)**	**Exceedences of the Hourly Mean (50µg/m^3)**	**Data Capture (%)**
	(GR9)											
	Plumstead High Street (GN3)	545560	178526	-	-	-	-	-	-	23	15	76
	Fiveways Sidcup Rd A20 (GN4)	543582	172653	-	-	-	-	-	-	28	26	95
	Woolwich Flyover (GR8)	540200	178367	33	33	>90	32	26	>90	-	-	-
London Borough of Redbridge	RB1 Perth Terrace, Ilford	544380	187660	15	2	88	18	2	>90	21	2	98
	RB4	54081	18837	20	7	>90	30	22	>90	27	0	7

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average PM10 Concentration 2012 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM10 Concentration 2013 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM10 Concentration 2014 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**
	Gardener Close, Wanstead	0	0									
London Borough of Southwark	Old Kent Road	534844	177515	25	19	82	27	28	78	24	10	39
	Elephant and Castle	531893	178846	-	-	-	20	0	80	-	-	-
The City of London	CT3 - John Cass School	533475	181179	26	13	94	36	**42**	>90	-	-	-
	CT4 - Beech Street	532141	181861	28	**42**	99	32	**35**	>90	-	-	-
	CT8 - Upper	53283	18069	-	-	-	**42**	**71**	>90	-	-	-

Local Authority	**Monitoring Station**	**x**	**y**	**Annual Average PM10 Concentration 2012 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM10 Concentration 2013 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**	**Annual Average PM10 Concentration 2014 (µg/m³)**	**Exceedences of the Hourly Mean (50µg/m³)**	**Data Capture (%)**
	Thames Street	4	1									
London Borough of Tower Hamlets	Blackwall (TH4)	538290	181452	26	24	-	28	24	>90	29	16	61
	Poplar (TH1)	537509	180867	22	14	-	24	6	49	-	-	-
	Victoria Park (TH5)	536487	184238	-	-	-	22	7	>90	-	-	-
Thurrock Council	London Road Purfleet	556698	177937	24	14	-	27	20	>90	-	-	-
	Stanford-Le-Hope	569356	182736	-	-	-	24	16	78	19	10	94

Local Authority	Monitoring Station	x	y	Annual Average PM_{10} Concentration 2012 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)	Annual Average PM_{10} Concentration 2013 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)	Annual Average PM_{10} Concentration 2014 (µg/m³)	Exceedences of the Hourly Mean (50µg/m³)	Data Capture (%)
	TH1 - Grays	560900	177700	18	10	>90%	19	4	>90	19	10	96
London Borough of Waltham Forest	WL1 Dawlish Road (closed 2011)	538380	186717	18	8	95	21	3	>90	-	-	-
	WL4 Crooked Billet	537468	191071	32	14	99	31	22	>90	-	-	-
	WL5 Ruckholt Close	537804	186025	19	20	99	21	8	>90	-	-	-

No values (-) where no ratified data was available, values in bold exceed the AQS objectives, values in red have less than a 75% data capture.

Table 6-10 Annual mean $PM_{2.5}$ (µg/m³) concentrations recorded by continuous monitoring sites from local authorities within the study area

Local Authority	Monitoring Station	x	y	Annual Average $PM_{2.5}$ Concentration 2012 (µg/m³)	Data Capture (%)	Annual Average $PM_{2.5}$ Concentration 2013 (µg/m³)	Data Capture (%)	Annual Average $PM_{2.5}$ Concentration 2014 (µg/m³)	Data Capture (%)
London Borough of Bexley	Belvedere (BX2)	549975	179064	9	99	10	99	9	98
	Belvedere West (BQ7)	548259	179473	9	97	9	92	9	95
	Erith (BX4)	552234	177690	16	81	16	89	16	59
	Slade Green FDMS (BX1)	551860	176376	12	91	16	98	16	90
London Borough of Hackney	Hackney 6 (HK6) - Old Street	532945	182570	14	95	14	98	14	99
London Borough of Havering	Rainham	553110	182516	-	-	11	28	-	-

Local Authority	Monitoring Station	x	y	Annual Average $PM_{2.5}$ Concentration 2012 (µg/m³)	Data Capture (%)	Annual Average $PM_{2.5}$ Concentration 2013 (µg/m³)	Data Capture (%)	Annual Average $PM_{2.5}$ Concentration 2014 (µg/m³)	Data Capture (%)
London Borough of Lewisham	New Cross (LW2)	536241	176932	12	34	18	98	17	95
Royal Borough of Greenwich	Burrage Grove (GR10/GN0)	544084	178881	18	88	18	72	17	71
	Eltham (GR4)	543978	174655	13	92	15	65	12	84
	Millennium Village (GR12/GN2)	540169	178999	15	94	15	89	15	83
	Westhorne Avenue (GR9)	541879	175016	16	16	17	93	16	95
	Plumstead High Street (GN3)	545560	178526	19	43	15	88	16	90
	Woolwich	540200	178367	15	98	15	96	15	95

Local Authority	Monitoring Station	x	y	Annual Average $PM_{2.5}$ Concentration 2012 (µg/m³)	Data Capture (%)	Annual Average $PM_{2.5}$ Concentration 2013 (µg/m³)	Data Capture (%)	Annual Average $PM_{2.5}$ Concentration 2014 (µg/m³)	Data Capture (%)
	Flyover (GR8)								
London Borough of Redbridge	RB4 Gardener Close, Wanstead	540810	188370	15	84	17	92	-	-
London Borough of Tower Hamlets	Blackwall (TH4)	538290	181452	15	96	16	90	16	90
Thurrock Council	Stanford-Le-Hope	569356	182736	15	81	14	87	14	92

No values (-) where no ratified data was available, values in red have less than a 75% data capture.

Scheme Specific Monitoring Data

6.4.10 A twelve month monitoring survey was undertaken to ensure that there was a robust dataset in preparation for the Scheme air quality assessment. As part of the Scheme air quality monitoring, 73 NO_2 diffusion tubes (using 20% TEA in water method of preparation) were deployed and exposed around the study area during the period between 13 January 2014 and 9 January 2015. The monitoring locations were chosen to fill 'data gaps' where no local authority monitoring was present in the vicinity of roads likely to be affected by the Scheme (Drawing 6.6 in Volume 2 of this PEIR).

6.4.11 Due to the inherent bias associated with passive NO_2 diffusion tubes, it is necessary to utilise an adjustment factor which can be applied to the monitoring dataset in order to calculate a more accurate ambient concentration. Throughout the monitoring period, triplicate diffusion tubes were co-located at two automatic monitors; New Cross in Lewisham and Belvedere West in Bexley. The measured NO_2 concentrations for the respective automatic monitors were downloaded from the London Air Quality Network for the period between 13 January 2014 and 9 January 2015. The recorded automatic data was screened in the interests of quality assurance.

6.4.12 At the Belvedere West data capture at the automatic site across the monitoring period was found to be >98%. At New Cross data capture at the automatic sites across the monitoring period was >98%. However it was noticed that between April and September 2014 the co-located diffusion tubes were reading more than double what the automatic monitor had recorded. The Environmental Health officer responsible for the site was contacted to query the validity of the recorded automatic data. The site operators investigated the issue and found that there was a systematic under-reading of recorded concentrations due to large drift of the analyser and that a manual calibration was overdue. Therefore it was decided to proceed using the data from Belvedere West only.

6.4.13 The bias adjustment factor at Belvedere West was found to be 0.79. This factor suggests that the diffusion tubes were systematically under-reading concentrations of NO_2. This factor was applied to the raw data presented in Table 6-11. The bias adjusted NO_2 results from the diffusion tube survey are presented in Table 6-11.

Table 6-11 2014 mean NO_2 (μg/m³) concentrations from Hyder monitoring diffusion tubes located around the study area

Site Number	Name	XY	Description	Type	Bias Adjusted + Annualised Mean
1	A13/Douglas Road	540295 181768	Traffic camera pole (blue) 05480	K	**62**
2	Douglas Road	540302 181791	On lamppost no. 5 (white)	R	**45.2**
3	Douglas Road/Kildare Road	540299 181841	On lamppost no. 3	R	38
4	Shooters Hill Road	543658 176492	On lamppost no. 5 (white)	K	**43.1**
5	Victoria Dock Road/Tarling Road	539896 180842	On black lamppost no. 30 (Victoria Road closed for Crossrail)	R	36.9
6	Hanover Avenue/Fitzwilliam Mews	540180 180371	On black lamppost no. 15	R	36.6
7	Hanameel Street South/Silvertown Way	540641 180148	On blue lamppost no. 80F	R	36.7
8	Hanameel Street North	540636 180192	On lamppost no. 24	R	34.5
9	Bradfield Road	540626 180055	On lamppost no. 3	I	37.7
10	Bisson Road	538284 183463	On lamppost no. 1A next to the Birch mini bar.	R	38.2
11	Jersey Road	541060 181491	On black lamppost no. 1	R	34.8
12	Stephen's Road	539411 183525	On Telegraph Pole 1 next to House 62 (DT9L9511?)	R	35.8

Site Number	Name	XY	Description	Type	Bias Adjusted + Annualised Mean
13	Collier Close	543694 180899	On lamppost no. 1 in residential parking	R	31.4
14	Strait Road	542937 180912	On lamppost no. 23 near Campion Close	R	31.6
15	Ridgwell Road	541445 181866	On lamppost no. 9 outside number 60	R	**44.5**
16	A13 Slip Road	542739 182119	Lamppost CCC9	R	**45.5**
17	Greengate Street	540737 182923	On lamppost no. 64	K	**46.6**
18	Richard House Drive	542032 181082	On lamppost no. 8 outside number 40	UB	28.5
19	Connaught Road	541939 180194	Opposite gated residential parking on lamppost no. 32	K	37.8
20	Oxleas	543748 181309	On lamppost no. 10	UB	29.1
21	Burges Road	543425 183913	White lamppost next to house 373	R	39.6
22	247a Wanstead Park Road	542649 187015	On telegraph pole DP1081	R	37.2
23	Blaney Crescent	543609 182738	Telegraph pole next to Blaney Crescent	UB	34.5*
24	Romford Road	541047 185091	On lamppost no. 69	K	**54.3**
25	241 Lavender Place	543587 185259	On lamppost no. 18	R	37.9
26	Alfred Gardens	545603	Lamppost ML233	R	**44**

Site Number	Name	XY	Description	Type	Bias Adjusted + Annualised Mean
		183461	next to House 43		
27	Dalemain Mews	540260 180329	On lamppost no. 2 in residential parking area	R	36.1
28	Blackwall Way	538494 180390	On lamppost near Recycling Centre	I	38.3
29	Dickson Road	542464 175593	On lamppost no. 1600422	R	38.9
30	Scrattons Terrace North	547752 183529	On lamppost no. J16 North opposite House no.67	R	36.7
31	Scrattons Terrace South	547742 183479	On lamppost no.	UB	34.8
32	Purfleet Road	555350 179894	Telegraph pole next to House 195	R	36.1
33	A1112	550721 184263	On lamppost no. B28	R	31.4
34	New Road	551010 182847	Post national Cycle Network No. 13 on the corner of Manser Road	R	39.4
35	Crescent Road	540988 190427	On lamppost no. 151 next to House 3	R	**42.2**
36	Poppleton Road	539474 187856	On telegraph pole (DP850)	R	**43.6**
37	Downsell Road/High Road Leyton	538420 185629	On lamppost no. 11	K	**45.6**
38	Parsloes Avenue	547933 185599	Lamppost HD1, On corner of Haskard Road	R	33.6**

Site Number	Name	XY	Description	Typ e	Bias Adjusted + Annualised Mean
39	Glenister Street	543451 179951	On lamppost no. 9 by alley to main road	R	31.3
40	Winifred Street	542756 180020	On white lamppost no. 1	R	35.4
41	Pier Road	543321 179863	On lamppost no. PR03	K	**46.6**
42	Woodman Street	543727 180071	On lamppost no. 1	R	31.9
43	Moseley Row	539762 178987	On lamppost no. 04k2234	R	37.8**
44	Corner of Tunnel Avenue/Blackwall Lane	539532 178859	On brown lamppost (no number)	R	**45.4**
45	Pilot busway on corner of Becquerel Street	539831 179181	On silver lamppost (no number)	R	36
46	Tunnel Avenue cul-de-sac	539568 178765	On lamppost no. 26	R	**40.7**
47	Lane off Tunnel Avenue	539732 178646	Second lamppost down lane (no number)	R	34.5*
48	Mercers Close	539732 178585	On telegraph pole (no. A1024)	R	34.8
49	Denford Street	539775 178290	On lamppost no. 1L0410	R	39.2
50	Glenforth Street	539773 178396	On lamppost no. 7L0594	UB	33.2
51	Woolwich Road near Denham Street	540025 178291	On lamppost no. W1117 blue sticker	K	**49**
52	Woolwich Road	540337	On lamppost (no.	K	**65.3**

Site Number	Name	XY	Description	Type	Bias Adjusted + Annualised Mean
		178361	C572 green sticker)		
53	Farmdale Road	540278 178275	On lamppost (no. 5k0519)	R	**48.9**
54	Lancey Close	542008 178984	On silver lamppost (no number)	R	**50.6**
55	Blackheath/Shooters Hill Road (A2)	540015 176876	On lamppost no. 41	K	**64.6**
56	Maud Cashmore Way	542879 179156	On lamppost outside number 34/35	R	33.2
57	Charles Grinling Walk	543193 178874	On lamppost no. 05B0252	UB	29.9
58	St John's Road	550745 178503	On lamppost	UB	27.9
59	Falmouth Gardens	541556 189245	On lamppost no. 30 (J645PP) after Whitney Avenue	K	33.2
60	Maximfeldt Road South	551054 178236	On green lamppost no. 6	R	38.5
61	Maximfeldt Road North	551105 178282	On lamppost no. 3	UB	31.2
62	McCudden Road	554850 175698	On lamppost no. AMJ5002	R	33.4
63	Oakfield Lane	553158 172562	Lamppost across from Barclay Court	K	36.2
64	Heathwood Walk No's 1-8	551201 173213	On lamppost no. AHDR001	UB	25.5
65	Sewell Road	547248 180050	On lamppost no. 65R127	UB	28.8**
66	Glenlea Road (1)	543371 175056	Green lamppost opposite House 79	R	32.6

Site Number	Name	XY	Description	Type	Bias Adjusted + Annualised Mean
67	Tile Kiln Lane	550319 172750	70 m down road on tree	B	17.3
68	Grantham Road	543213 186103	On lamppost no. 23 opposite building 12 Acre House	R	**40.2***
69	Glenlea Road (2)	543530 175196	Concrete lamppost opposite House 27	R	34.2
70	Topley Street	541474 175415	On lamppost no. 02B151A	R	32.3
71	Will Crooks Gardens	541718 175296	Outside no. 20 on lamppost no. 13B1	R	35.1
72	Harrier Mews	544996 179519	On lamppost no. 5	R	31
73	Marathon Way	545590 179903	On lamppost no. T2233	R	28.2**

Type Abbreviations:
B – Background I - Industrial K – Kerbside R – Roadside UB – Urban Background

Bold denotes exceedence of the Annual Mean Objective for NO_2 of 40 µg/m^3
No asterisk – Data capture >90%
* - Data capture 75-90%
** - Data capture <75%

‘No to Silvertown Tunnel’ air quality monitoring

6.4.14 The ‘No to Silvertown Tunnel’ group undertook air quality monitoring of NO_2 using passive diffusion tubes in February of 2013, 2014 and 2015 in the vicinity of the proposed Scheme. The studies provided a useful indicative insight into winter time concentrations and showed that concentrations were very high, often above 70µg/m^3 at a number of locations in the study area (Ref 6-37). This data was not formally utilised in the air quality assessment or modelling as LAQM (TG(09)) states that for comparison against the annual mean AQS objective, monitoring surveys should be a minimum of three consecutive months, ideally six consecutive months (including three months winter and three months summer) to ensure that the average concentrations are representative.

Air Quality Management Areas

6.4.15 Part IV of the Environment Act 1995 sets out the principles of Local Air Quality Management (LAQM) and includes provision for a national Air Quality Strategy. It is a requirement of the Act that local authorities review current and future air quality within their areas, and assess whether air quality objectives are being achieved or are likely to be achieved. Where it is anticipated that an air quality objective will not be met, it is a requirement of the Act that an Air Quality Management Area (AQMA) be declared. Where an AQMA is declared, the local authority is obliged to produce an Action Plan in pursuit of the achievement of the air quality objectives.

6.4.16 A description of Air Quality Management Areas (AQMAs) declared by the Local Authorities located within the study area is presented Table 6-12. The AQMAs are presented on Drawing 6-9.

Table 6-12 Local Authority Air Quality Management Areas

Local Authority	AQMA Name	Pollutant and declaration	Area Description
Dartford Borough Council	Dartford AQMA No.1	Annual mean NO_2	A corridor approximately 250m wide along the A282 Dartford Tunnel Approach Road from junction 1a to 300m south of junction 1b.
London Borough of Barking and Dagenham	Barking and Dagenham AQMA	NO_2 – 1 hour and Annual mean PM_{10} – 24 hour mean	An area encompassing the whole borough.
London Borough of Bexley	Bexley AQMA	NO_2 - Annual Mean PM_{10} - Annual and 24 hour mean	The whole borough of Bexley.

Local Authority	AQMA Name	Pollutant and declaration	Area Description
London Borough of Hackney	Hackney AQMA	PM_{10} - 24 hour mean	An area covering the whole borough of Hackney.
London Borough of Lewisham	Lewisham AQMA	NO_2 –Annual mean PM_{10} – 24 hour mean	The Air Quality Management Areas for the Borough of Lewisham consist of four large AQMAs and a series of ribbon roads.
London Borough of Newham	Newham AQMA	NO_2 –Annual mean PM_{10} – 24 hour mean	Main roads within the borough.
London Borough of Redbridge	Redbridge AQMA	NO_2 –Annual mean PM_{10} – 24 hour mean	The whole borough.
London Borough of Southwark	Southwark AQMA	NO_2 –Annual mean PM_{10} – 24 hour mean	An area encompassing the entire northern part of the borough, extending from Rotherhithe to Walworth and Camberwell and up to the boundary on the River Thames. The area is along the A2, A200, A215 and A202 south to the A205.
London Borough of Tower Hamlets	Tower Hamlets AQMA	NO_2 –Annual mean PM_{10} – 24 hour mean	The whole borough.
London Borough of Waltham Forest	Waltham Forest AQMA	NO_2 –Annual mean PM_{10} – 24 hour mean	The whole borough.
Royal Borough of	Greenwich AQMA	NO_2 –Annual	The whole borough.

Local Authority	AQMA Name	Pollutant and declaration	Area Description
Greenwich		mean PM_{10} – 24 hour mean	
Thurrock Council	Thurrock AQMA	*Thurrock AQMA:* NO_2 –Annual mean PM_{10} – 24 hour mean NO_2	Consists of 15 separate areas, comprising several ribbons, clusters and isolated properties which are close to the busiest roads in Thurrock. All 15 areas are declared with respect to nitrogen dioxide, four of these are also declared with respect to particles.

6.4.17 In addition to AQMAs, the impacts of the Scheme on Air Quality Focus Areas (AQFAs) in the vicinity of the ARN were considered in the assessment. AQFAs are areas identified by TfL and Greater London Authority (GLA) as locations that exceed the EU annual mean limit value for NO_2 where there are sensitive receptors. AQFAs allow those local authorities with borough-wide NO_2 based AQMAs to identify air quality hotspots. Worst-case receptors were deliberately placed in those AQFAs in the vicinity of the ARN.

6.4.18 A full list of the AQFAs likely to be affected by the Scheme is presented in Table 6-13.

Table 6-13 Air Quality Focus Areas in the vicinity (within 500m) of the ARN

ID No	Local Authority	Description
31	Redbridge	A12 Eastern Avenue at Wanstead (east of Tunnel)
41	Greenwich	Blackwall Tunnel at Southern Approach Road and Westcombe Park
42	Greenwich	Sun-in-the-Sands junction A102/A2 Shooters Hill and Charlton Rd Rbt

ID No	Local Authority	Description
43	Greenwich	Greenwich Centre
31	Newham	A12 Eastern Avenue at Wanstead (east of Tunnel)
32	Newham	A12 Easter Avenue at Redbridge
35	Newham	A118 Romford Road at Manor Park btwee Green St and Little Ilford Lane
38	Newham	Barking Road A124 from Canning Town to Wallend/Barking
44	Greenwich	Greenwich Trafalgar Road A206
45	Lewisham	Deptford Church Street/Broadway/Evelyn Street
46	Lewisham	New Cross Gate and New Cross
54	Greenwich	Eltham High Street
55	Greenwich	Westhorne Avenue A205
59	Tower Hamlets	Aldgate and Aldgate East
60	Tower Hamlets	Commercial Road from Aldgate East to junction Jubilee Street
62	Tower Hamlets	Tower Hill/Tower Gateway/Cable St/The Highway
63	Tower Hamlets	Blackwall A13 East India Dock Road/Aspen Way/Blackwall Tunnel
69	Barking & Dagenham	Barking Abbey Rd/Barking Relief Road/London Rd A124/Ripple Rd A123
142	Hackney	Hackney Wick Homerton High Street/Wick Road/Cassland Rd/Victoria Pk Rd

ID No	Local Authority	Description
179	Newham	Canning Town Silvertown Way
180	Newham	Newham Way A13 and Prince Regent Lane
181	Barking and Dagenham	A13 Ripple Road
184	Southwark	Tower Bridge Road A100
187	Southwark	Lower Road A200 Surrey Quays

Base Year (2012) Modelled Receptors Results

6.4.19 Sensitive receptors were chosen within 200m of roads that triggered the DMRB criteria. A total of 179 worst-case receptors (these are receptors located in the study areas where the impacts of the Scheme are likely to be greatest e.g. located nearest to busy roads or junctions) were modelled. Both existing and future receptors were modelled. The locations of future receptors were determined using the limited information available at the time of writing, therefore a conservative approach was adopted. Future receptor points were added to the site boundary of consented developments in the absence of defined building footprints. Predicted annual mean concentrations of NO_2, $PM_{2.5}$ and PM_{10} for the Base Year (2012) for the worst-case sensitive receptors identified (see Drawing 6-5 for location) are presented in Table 6-14. The modelled concentrations have been verified following the approach outlined in Appendix 6.A.

Table 6-14 Worst-case Receptor Information and Annual mean NO_2, PM_{10} and $PM_{2.5}$ (µg/m³) modelled concentrations Base Year 2012

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
AQS Objective	**-**	**40**	**40**	**35**	**25**	**-**	**-**
Future Development (FD)1	538348 180659	**82.3**	26.5	16	20.8	Tower Hamlets AQMA	63
FD10	539958 180811	39.6	22.7	8	18.2		
FD12	539788 180923	**43.9**	22.9	8	18.3	Newham AQMA	179
FD13	539695 181088	**45.6**	23.7	10	18.8	Newham AQMA	179
FD14	539804 181118	37.8	23.3	9	18.5		
FD18	539372 179715	**50.5**	22.4	7	17.8	Greenwich AQMA	
FD19	539173 179547	**43.0**	22.5	7	17.9	Greenwich AQMA	
FD2	538421 180917	**94.5**	27.9	20	21.8	Tower Hamlets	63

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
						AQMA	
FD20	539418 179369	**42.0**	22.4	7	17.8	Greenwich AQMA	
FD21	539490 179434	39.6	22.1	7	17.6	Greenwich AQMA	
FD22	539755 179245	38.5	22.1	6	17.6	Greenwich AQMA	
FD23	539619 179123	**44.1**	22.5	7	17.9	Greenwich AQMA	
FD24	539563 179092	**43.7**	22.5	7	17.9	Greenwich AQMA	
FD25	539531 179041	**48.0**	22.8	8	18.1	Greenwich AQMA	
FD26	539457 179070	**61.9**	23.9	10	19.0	Greenwich AQMA	
FD27	539515 179653	33.6	22.0	6	17.5	Greenwich AQMA	
FD3	538685 180875	**85.7**	26.9	17	21.0	Tower Hamlets AQMA	63

Receptor Name	**XY**	**Modelled Annual Mean NO_2 (µg/m³)**	**Modelled Annual Mean PM_{10} (µg/m³)**	**Number of Daily PM_{10} > 50µg/m³**	**Modelled Annual Mean $PM_{2.5}$ (µg/m³)**	**In AQMA?**	**In AQFA?**
FD4	538841 181021	**56.9**	25.0	12	19.7	Tower Hamlets AQMA	
FD5	538778 181164	**67.0**	25.6	14	20.1	Tower Hamlets AQMA	
FD6	539282 180889	39.5	22.7	8	18.2	Tower Hamlets AQMA	
FD9	539901 180727	**53.8**	23.4	9	18.7	Newham AQMA	
Receptor (R)100	549842 174284	**42.7**	21.9	6	17.4	Bexley AQMA	
R116	548404 183581	38.2	22.0	6	17.4	Barking and Dagenham AQMA	
R117	548227 183504	**41.3**	22.3	7	17.6	Barking and Dagenham AQMA	
R118	547761 183541	**46.9**	22.9	8	18.0	Barking and Dagenham AQMA	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
R119	546643 183679	**66.1**	25.0	12	19.5	Barking and Dagenham AQMA	181
R120	546454 183694	**64.7**	24.4	11	19.2	Barking and Dagenham AQMA	181
R121	545491 183426	**49.9**	23.9	10	18.7	Barking and Dagenham AQMA	
R122	544861 183222	**65.6**	25.7	14	20.0	Barking and Dagenham AQMA	
R123	543177 182340	**50.9**	24.1	10	18.9	Newham AQMA	
R124	542884 182174	**50.5**	24.3	11	19.1	Newham AQMA	
R125	542687 182107	**54.2**	24.6	11	19.3	Newham AQMA	
R126	542755 182030	**45.6**	23.8	10	18.8		
R127	542989	37.8	20.9	5	17.0		

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	181848						
R128	543706 181725	32.7	21.1	5	17.1		
R129	543750 181330	34.3	21.2	5	17.1		
R130	543679 181073	38.5	21.4	5	17.3		
R131	543715 180875	**42.3**	21.4	5	17.5		
R132	543873 180732	36.9	21.2	5	17.3		
R133	543808 180657	36.6	21.2	5	17.3		
R134	543868 180629	39.5	21.3	5	17.4		
R139	543103 181357	34.5	21.2	5	17.1		
R140	543182 181237	35.5	21.3	5	17.2		
R141	543298	**40.3**	21.4	5	17.5		

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	180940						
R142	543212 180912	35.4	21.1	5	17.3		
R143	541831 180975	35.0	21.9	6	17.8		
R144	542195 182070	**49.8**	24.2	11	19.0		
R145	541506 181904	**55.9**	24.3	11	19.2	Newham AQMA	
R146	541278 181766	**51.7**	23.8	10	18.9	Newham AQMA	
R147	541118 181717	**57.7**	24.2	11	19.1	Newham AQMA	180
R148	541088 181544	**48.0**	23.2	9	18.4		
R149	541178 181148	**47.5**	23.2	8	18.4		
R150	541081 181868	**48.2**	23.5	9	18.6		
R154	541050	**63.2**	24.9	12	19.7	Newham	180

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	181783					AQMA	
R155	540787 181780	**58.1**	24.8	12	19.5	Newham AQMA	180
R156	540585 181742	**67.1**	25.5	14	20.0	Newham AQMA	180
R157	540376 181775	**68.8**	25.8	14	20.3	Newham AQMA	180
R158	540081 181780	**49.5**	23.9	10	18.9	Newham AQMA	
R159	539902 181658	**63.1**	25.5	14	20.1	Newham AQMA	
R160	539704 181563	**49.9**	24.3	11	19.2	Newham AQMA	
R161	537985 182874	**60.6**	24.8	12	19.6	Tower Hamlets AQMA	
R162	539461 181603	**65.3**	25.2	13	19.9	Newham AQMA	
R163	539601 181303	**40.9**	23.4	9	18.6		179

Receptor Name	**XY**	**Modelled Annual Mean NO_2 (µg/m³)**	**Modelled Annual Mean PM_{10} (µg/m³)**	**Number of Daily PM_{10} > 50µg/m³**	**Modelled Annual Mean $PM_{2.5}$ (µg/m³)**	**In AQMA?**	**In AQFA?**
R164	540169 180376	**41.0**	21.3	5	17.0	Newham AQMA	
R165	540853 180110	**43.9**	21.4	5	17.1	Newham AQMA	
R168	543479 185977	**53.4**	24.0	10	18.7	Redbridge AQMA	
R169	543248 186037	**47.2**	23.4	9	18.4		
R170	543133 186411	**54.2**	23.8	10	18.8	Redbridge AQMA	
R172	541903 188141	**63.3**	24.1	10	18.8	Redbridge AQMA	
R173	541845 188265	**75.1**	24.5	11	19.1	Redbridge AQMA	
R174	541756 188215	**66.9**	24.0	10	18.7	Redbridge AQMA	
R175	541616 188287	**69.0**	24.1	10	18.8	Redbridge AQMA	
R176	541837 188435	**66.4**	23.9	10	18.7	Redbridge AQMA	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
R177	541740 188689	**49.2**	23.1	8	18.1	Redbridge AQMA	
R178	541613 189107	**45.6**	22.5	7	17.7	Redbridge AQMA	
R191	536864 185074	**58.0**	24.5	11	19.2	Hackney AQMA	
R192	536813 185163	**55.8**	24.4	11	19.1	Hackney AQMA	
R193	536525 184906	**50.9**	25.3	13	19.7	Hackney AQMA	
R194	536463 184901	**53.8**	25.5	14	19.8	Hackney AQMA	
R195	536614 184946	**50.6**	25.3	13	19.7	Hackney AQMA	
R196	536447 184874	**51.5**	25.2	13	19.7	Hackney AQMA	
R197	536566 184679	**60.1**	25.6	14	19.9	Hackney AQMA	
R198	536798 184455	**49.2**	25.1	13	19.6	Hackney AQMA	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
R199	536959 184126	**58.2**	25.9	15	20.1	Tower Hamlets AQMA	
R20	535183 179447	**50.2**	22.5	7	18.0	Southwark AQMA	
R200	537029 183753	**57.5**	25.6	14	19.9	Tower Hamlets AQMA	
R201	537130 183585	**55.0**	25.4	13	19.7	Tower Hamlets AQMA	
R202	537586 183203	**56.7**	25.4	13	19.8	Tower Hamlets AQMA	
R203	537633 183166	**56.1**	25.3	13	19.7	Tower Hamlets AQMA	
R204	537886 183006	**68.5**	26.1	15	20.3	Tower Hamlets AQMA	
R205	538035 182718	**59.3**	24.9	12	19.7	Tower Hamlets	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
						AQMA	
R206	538019 182640	**56.8**	24.7	12	19.6	Tower Hamlets AQMA	
R207	538089 182371	**68.3**	25.4	13	20.1	Tower Hamlets AQMA	
R208	538155 182105	**60.8**	25.0	13	19.8	Tower Hamlets AQMA	
R209	538124 181870	**50.4**	24.9	12	19.6	Tower Hamlets AQMA	
R21	535180 179391	**46.6**	22.3	7	17.8	Southwark AQMA	
R210	538296 181501	**60.6**	25.7	14	20.1	Tower Hamlets AQMA	
R211	538310 181445	**61.4**	25.7	14	20.2	Tower Hamlets AQMA	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
R212	538425 181467	**51.4**	24.7	12	19.5	Tower Hamlets AQMA	
R213	538638 181402	**48.4**	24.6	11	19.3	Tower Hamlets AQMA	
R214	538891 181300	**56.3**	25.4	13	20.0	Newham AQMA	
R215	538931 181308	**63.8**	26.1	15	20.5	Newham AQMA	
R216	538331 181331	**67.5**	26.1	15	20.4	Tower Hamlets AQMA	
R217	538273 181232	**62.4**	25.4	13	20.0	Tower Hamlets AQMA	63
R218	538224 181153	**53.9**	24.9	12	19.6	Tower Hamlets AQMA	63
R219	538376 181172	**64.1**	25.6	14	20.1	Tower Hamlets AQMA	63

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
R22	535263 179301	**48.8**	22.4	7	17.9	Southwark AQMA	
R220	538239 181054	**73.0**	26.1	15	20.6	Tower Hamlets AQMA	63
R221	538394 181094	**72.6**	26.2	15	20.6	Tower Hamlets AQMA	63
R222	538328 181019	**70.6**	26.1	15	20.5	Tower Hamlets AQMA	63
R223	538362 180934	**66.9**	25.6	14	20.1	Tower Hamlets AQMA	63
R224	538355 180808	**98.2**	28.7	23	22.3	Tower Hamlets AQMA	63
R225	538624 181161	**64.3**	25.5	14	20.0	Tower Hamlets AQMA	63
R226	539887 180875	38.7	22.6	7	18.1		

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
R227	538596 180789	**61.8**	25.1	13	19.7	Tower Hamlets AQMA	63
R228	538222 180511	**55.5**	24.6	12	19.4	Tower Hamlets AQMA	63
R229	537430 180709	**79.5**	26.2	16	20.8	Tower Hamlets AQMA	
R230	537601 180674	**53.7**	24.5	11	19.6	Tower Hamlets AQMA	
R233	536950 183526	**58.9**	23.6	9	18.8	Tower Hamlets AQMA	
R236	538232 181014	**65.6**	25.6	14	20.2	Tower Hamlets AQMA	63
R237	538138 180897	**58.4**	24.6	11	19.4	Tower Hamlets AQMA	63
R238	538228	**68.9**	25.1	13	19.8	Tower	63

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	180763					Hamlets AQMA	
R239	538145 180757	**58.7**	24.6	11	19.4	Tower Hamlets AQMA	63
R240	538061 180762	**56.7**	24.5	11	19.3	Tower Hamlets AQMA	
R241	538147 181044	**67.7**	25.4	13	20.0	Tower Hamlets AQMA	63
R242	538098 181039	**62.4**	25.2	13	19.8	Tower Hamlets AQMA	
R243	537983 181025	**68.8**	23.8	10	19.0	Tower Hamlets AQMA	
R244	537937 181029	**58.6**	23.3	9	18.7	Tower Hamlets AQMA	
R250	536190 181117	**75.8**	25.9	15	20.4	Tower Hamlets	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
						AQMA	
R251	536160 181117	**74.0**	25.8	14	20.3	Tower Hamlets AQMA	
R252	536140 181005	**79.5**	26.5	16	20.8	Tower Hamlets AQMA	
R253	535994 180878	**112.2**	28.2	21	22.1	Tower Hamlets AQMA	
R254	536104 181152	**67.9**	25.3	13	19.9	Tower Hamlets AQMA	
R255	536015 181155	**75.2**	25.7	14	20.2	Tower Hamlets AQMA	
R27	536037 178083	**40.3**	21.5	6	17.3	Lewisham AQMA	
R30	536084 177854	**45.5**	22.2	7	17.7	Lewisham AQMA	
R31	536288	**43.5**	22.1	6	17.6	Lewisham	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	177301					AQMA	
R45	539571 178630	**43.4**	22.7	8	18.1	Greenwich AQMA	
R46	539567 178799	**49.7**	23.1	8	18.4	Greenwich AQMA	
R47	539539 178866	**52.3**	23.3	9	18.6	Greenwich AQMA	
R49	540184 178311	**69.7**	24.7	12	19.5	Greenwich AQMA	41
R50	539883 178522	**46.2**	23.2	8	18.4	Greenwich AQMA	
R51	540222 178344	**79.8**	25.7	14	20.3	Greenwich AQMA	41
R59	539845 178895	**42.3**	22.6	7	18.0	Greenwich AQMA	
R60	539952 179024	38.3	22.1	6	17.6	Greenwich AQMA	
R61	539784 179221	38.0	22.1	6	17.6	Greenwich AQMA	
R62	539681	**41.0**	22.4	7	17.8	Greenwich	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	179093					AQMA	
R63	540266 178278	**66.0**	24.9	12	19.7	Greenwich AQMA	41
R64	540372 178017	**48.0**	23.7	9	18.7	Greenwich AQMA	42
R65	540382 177847	**45.7**	23.4	9	18.5	Greenwich AQMA	42
R66	540454 177635	**48.5**	23.8	10	18.8	Greenwich AQMA	42
R67	540655 177266	**49.9**	23.8	10	18.8	Greenwich AQMA	42
R68	540731 177083	**54.8**	24.1	10	19.1	Greenwich AQMA	42
R69	540654 177087	**54.0**	24.2	11	19.1	Greenwich AQMA	42
R70	540639 176999	**50.8**	22.8	8	18.1	Greenwich AQMA	42
R71	540708 177090	**59.9**	24.8	12	19.5	Greenwich AQMA	42
R72	540766	**53.4**	24.0	10	18.9	Greenwich	42

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	177042					AQMA	
R73	540750 176993	**52.3**	23.4	9	18.5	Greenwich AQMA	42
R74	540686 176975	**47.3**	22.7	8	18.1	Greenwich AQMA	42
R75	540743 176841	**41.5**	22.3	7	17.8	Greenwich AQMA	42
R76	540805 176727	**42.2**	22.4	7	17.8	Greenwich AQMA	
R77	541080 176298	39.6	21.2	5	17.1	Greenwich AQMA	
R78	541127 176074	**51.6**	22.4	7	17.9	Greenwich AQMA	
R79	541170 175710	36.8	22.4	7	17.7	Greenwich AQMA	
R80	541084 175526	32.5	22.0	6	17.4	Greenwich AQMA	
R81	541234 175446	34.7	22.2	7	17.6	Greenwich AQMA	
R82	541631	35.8	22.4	7	17.7	Greenwich	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	175351					AQMA	
R83	541786 175258	39.0	22.6	7	17.9	Greenwich AQMA	
R84	541919 175060	**45.4**	22.8	8	18.0	Greenwich AQMA	55
R85	541455 175857	33.1	22.0	6	17.5	Greenwich AQMA	
R86	541343 175971	35.2	22.2	7	17.6	Greenwich AQMA	
R87	541850 174984	**41.6**	21.2	5	17.0	Greenwich AQMA	55
R94	542637 174864	**44.4**	22.0	6	17.5	Greenwich AQMA	
R95	544438 175270	38.9	21.2	5	17.0	Greenwich AQMA	
R96	544875 175197	**41.8**	21.6	6	17.2	Bexley AQMA	
R96a	545623 174864	38.8	21.1	5	16.9	Bexley AQMA	
R97	547513	**51.4**	22.3	7	17.8	Bexley AQMA	

Receptor Name	XY	Modelled Annual Mean NO_2 (µg/m³)	Modelled Annual Mean PM_{10} (µg/m³)	Number of Daily PM_{10} > 50µg/m³	Modelled Annual Mean $PM_{2.5}$ (µg/m³)	In AQMA?	In AQFA?
	174401						
R98	547681 174372	**60.0**	23.6	9	18.7	Bexley AQMA	
R99	548531 174290	**47.2**	21.7	6	17.3	Bexley AQMA	

6.4.20 The results of the base year 2012 modelling are presented in Table 6-15 and show that the majority of worst-case receptors exceed AQS Objectives. The annual mean AQS objective for NO_2 is exceeded at 148 of the 179 modelled locations. The average NO_2 concentration across all of the receptors in the study area is 53.5 µg/m^3. The highest concentration is predicted at R253, which is a property located immediately south of the A1203 at the western end of the Limehouse Link. The 2012 modelled concentration is 112.2 µg/m^3, and is attributable to the combination of heavy congestion along the A1203 and portal emissions from the Limehouse Link and Rotherhithe tunnels.

6.4.21 Receptors located within 500m of the A12/A13 junction in Poplar have been assessed to show concentrations ranging between 50-98 µg/m^3. The modelled base year concentration exceeds 60 µg/m^3 at a number of locations. Therefore, according to para 2.34 of LAQM.TG(09), there is a risk that the hourly AQS objective for NO_2 (200 µg/m^3 not to be exceeded more than 18 times in a year) was not met at these locations in the base year.

6.4.22 Modelled annual mean PM_{10} and $PM_{2.5}$ concentrations were both below the AQS objectives at all receptors. Following the procedure detailed in para 2.36 of LAQM (TG(09)), the modelled annual mean concentrations of PM_{10} have been used to estimate the number of days where the 24 hour average concentration is >50 µg/m^3. The 24 hour AQS objective for PM_{10} is exceeded if the number of days >50 µg/m^3 is greater than 35. The 24 hour modelled concentration at R224 exceeded 50 µg/m^3 23 times during 2012, which was the highest number of days predicted of any of the modelled receptors. This receptor is located immediately west of the northern portals of the Blackwall Tunnel. The annual mean PM_{10} concentration at R224 was 28.3µg/m^3. Therefore the modelled base year results demonstrate that the annual and 24 hour AQS objectives for PM_{10} were not breached in 2012. The highest annual concentration for $PM_{2.5}$ was 22.3 µg/m^3 at R224. The annual mean objective for $PM_{2.5}$ is 25 µg/m^3, therefore the modelled results indicate that none of the receptors exceed this objective.

6.5 Scheme Design and Mitigation

Construction

6.5.1 The assessment for the PEIR has not included an assessment of the construction dust activities as but this will be considered presented as part of the ES submitted with the DCO application. However a Preliminary Code of Construction Practice is presented in Appendix 4.A in Volume 3 of this PEIR. This section summarises the types of mitigation measures that will be included in the Scheme in order to mitigate against the impacts of construction dust.

They represent Best Practicable Measures (BPM) which should be adopted during the construction phase.

Site Planning

- No burning of waste materials on site;
- Plan site layout – machinery and dust causing activities should be located away from sensitive receptors;
- All site personnel to be fully trained;
- Trained and responsible manager on site during work times to maintain logbook and carry out site inspections;
- Visual inspections should be undertaken on a daily basis to determine whether there are any significant dust episodes as a result of the construction activities;
- Hard surface site haul routes;
- Ensure adequate water supply on site;

Construction Traffic and Non-Road Mobile Machinery (NRMM)

- All vehicles to switch off engines – no idling vehicles;
- All commercial road vehicles used on the construction project will meet the European Emission Standards (commonly known as Euro standards). Should new emissions standards be introduced they shall be applied to all road vehicles serving the construction project within a period of 2 years from the date of introduction contained within the relevant EU Directive;
- All NRMM with a power of between 37KW and 560KW must comply with Stage IIIA of EU Directive 97/68/EC (Ref 6-38) until September 1st 2020 when NRMM will be required to meet Stage IIIB of EU Directive 97/68/EC;
- All NRMM to use ultra-low sulphur tax-exempt diesel (ULSD) where available and be fitted with appropriate exhaust after-treatment from the approved list;
- Effective vehicle cleaning and specific wheel-washing on leaving site and damping down of haul routes, where there is potential for carrying dust or mud off the site;
- Routinely clean public roads and access routes using wet sweeping methods;
- All loads entering and leaving the site to be covered;
- No site runoff of water or mud;
- On-road vehicles to comply to set emission standards;

- Ensure vehicles working on site have exhausts positioned such that the risk of re-suspension of ground dust is minimised (exhaust should preferably point upwards), where reasonably practicable;
- Minimise movement of construction traffic around site;
- Impose and signpost maximum speed limits of 5mph on unsurfaced haul routes and work areas and 10mph on surfaced haul routes and work areas;
- Hard surfacing and effective cleaning of haul routes and appropriate speed limits around site (not allow dry sweeping of large areas). Regular dampen down with fixed or mobile sprinkler systems and regularly cleaned;
- Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonable practicable, record all inspections in the log book;

Site Activities

- Minimise dust generating activities;
- Minimise the amount of excavated material stored on site;
- Ensure disposal of run-off water from dust suppression activities, in accordance with the appropriate legal requirements;
- Maintain all dust control equipment in good condition and record maintenance activities;
- Avoid double handling of material wherever reasonably practicable;
- Sheet or otherwise enclose loaded bins and skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- Use water as dust suppressant where applicable;
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction;
- ensure mixing of cement, bentonite, grout and other similar materials takes place in enclosed areas remote from site boundaries and potential receptors;
- ensure slopes on stockpiles are no steeper than the natural angle of repose of the material and maintain a smooth profile;
- ensure equipment is readily available on site to clean any spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;

- Cover, seed or fence stockpiles to prevent wind whipping where appropriate;
- Stockpiles should be located away from sensitive receptors as far as practicable;
- Re-vegetate earthworks and exposed areas;
- If applicable, ensure concrete crusher or concrete batcher has a permit to operate;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;

6.5.2 With the adoption of BPM measures as outlined above, the impact of construction activities would be reduced, and so should ensure that the impacts are minimised, if not eliminated. Additionally the Scheme construction plan has made provision to construct a jetty so that construction materials and excavated materials can be transported from the site using the river Thames as frequently as possible, thereby reducing the number of construction vehicles required on site and on the surrounding road network. The impact of emissions from construction vehicles will be assessed in the ES to ascertain whether they will affect air quality in the construction phase ahead of the opening year.

6.5.3 The identified mitigation measures will be incorporated into the Construction Environmental Management Plan (CEMP), reflecting the requirements of best practicable means (BPM). The CEMP is to be prepared prior to commencement of works and will outline environmentally sensitive areas, mitigation measures to protect such areas, and method statements for specific construction activities.

Operation

6.5.4 Mitigation measures to reduce the operational impact of the Scheme on air quality are embedded in the Scheme design. The tunnel user charge within the assessed case seeks to manage traffic and air quality impacts. Additionally the charging regime includes a discount for low emissions vehicles and electric cars are permitted to use the crossing free of charge, thereby promoting the use of cleanest vehicles. A tunnel vent has been included in the design at this stage to minimise portal emissions. The final design of the tunnel vent system will be incorporated into the modelling in the ES.

6.5.5 If the air quality assessment deems that the Scheme will lead to a significant impact in accordance with the NN NPS then mitigation measures will be investigated to determine whether the impacts can be mitigated. The types of mitigation measures that would be considered would include;

- varying the user charge to use the tunnels to influence traffic flows;
- speed control to constrain increases in traffic flow; and
- Further measures to promote use of the tunnels by cleaner vehicles.

6.6 Assessment of Impacts

Construction Impacts

6.6.1 The construction assessment will be presented in the ES, however it is anticipated that with BPM the impact of construction dust will not be significant. The impact of construction traffic will be quantified in the ES.

Operational Impacts

Nitrogen Dioxide

6.6.2 The reference case and assessed case in 2021 were modelled for the worse case receptors within 200m of the affected road network (see Drawing 6-1), the results for total modelled NO_2 are presented in Table 6-15.

Table 6-15 Modelled annual mean NO_2 concentrations in reference and assessed case (2021)

Receptor Name	Reference Case Modelled Annual Mean NO_2 (µg/m³) 2021	Assessed Case Annual Mean NO_2 (µg/m³) 2021	Change (with Scheme – without Scheme)
AQS Objective	**40**	**40**	**-**
FD1	**66.5**	**64.1**	-2.4
FD10	30.8	32.5	1.7
FD12	34.8	36.0	1.2
FD13	36.3	36.9	0.6
FD14	28.9	29.1	0.2
FD18	38.2	**40.0**	1.8
FD19	33.9	36.5	2.6
FD2	**73.3**	**62.8**	-10.5
FD20	35.8	35.8	0.0
FD21	30.5	30.8	0.3
FD22	29.4	29.6	0.2

Receptor Name	Reference Case Modelled Annual Mean NO_2 (µg/m³) 2021	Assessed Case Annual Mean NO_2 (µg/m³) 2021	Change (with Scheme – without Scheme)
FD23	36.3	35.7	-0.6
FD24	35.1	34.4	-0.7
FD25	37.4	36.0	-1.4
FD26	**47.7**	**44.2**	-3.5
FD27	25.5	25.7	0.2
FD3	**68.6**	**66.4**	-2.2
FD4	**44.4**	**43.1**	-1.3
FD5	**52.6**	**49.1**	-3.5
FD6	30.3	30.6	0.3
FD9	**42.6**	**47.5**	4.9
R100	33.7	33.5	-0.2
R116	29.5	29.3	-0.2
R117	32.4	32.1	-0.3
R118	37.4	36.9	-0.5
R119	**51.9**	**51.6**	-0.3
R120	**51.8**	**51.5**	-0.3
R121	39.1	38.7	-0.4
R122	**51.0**	**50.3**	-0.7
R123	39.6	39.3	-0.3
R124	39.2	39.0	-0.2
R125	**42.7**	**42.6**	-0.1
R126	35.4	35.2	-0.2
R127	28.8	28.8	0.0
R128	24.7	24.7	0.0
R129	26.0	26.0	0.0
R130	29.5	30.0	0.5
R131	32.2	32.5	0.3
R132	28.0	28.1	0.1
R133	27.7	27.8	0.1

Receptor Name	**Reference Case Modelled Annual Mean NO_2 (µg/m³) 2021**	**Assessed Case Annual Mean NO_2 (µg/m³) 2021**	**Change (with Scheme – without Scheme)**
R134	29.9	30.0	0.1
R139	26.1	26.4	0.3
R140	27.0	27.4	0.4
R141	30.7	31.4	0.7
R142	26.9	27.4	0.5
R143	26.7	26.9	0.2
R144	39.0	39.1	0.1
R145	**43.7**	**43.2**	-0.5
R146	**40.4**	**40.2**	-0.2
R147	**45.5**	**45.4**	-0.1
R148	38.0	38.3	0.3
R149	37.7	38.2	0.5
R150	37.1	36.9	-0.2
R154	**49.1**	**48.7**	-0.4
R155	**45.0**	**44.6**	-0.4
R156	**51.9**	**51.2**	-0.7
R157	**53.3**	**53.0**	-0.3
R158	37.9	37.7	-0.2
R159	**48.6**	**48.0**	-0.6
R160	38.2	37.8	-0.4
R161	**46.7**	**46.1**	-0.6
R162	**49.7**	**49.4**	-0.3
R163	31.4	31.6	0.2
R164	32.2	33.0	0.8
R165	34.9	35.7	0.8
R168	**41.6**	**41.3**	-0.3
R169	36.2	36.0	-0.2
R170	**42.2**	**41.9**	-0.3
R172	**49.9**	**49.4**	-0.5

Receptor Name	**Reference Case Modelled Annual Mean NO_2 (µg/m³) 2021**	**Assessed Case Annual Mean NO_2 (µg/m³) 2021**	**Change (with Scheme – without Scheme)**
R173	**58.6**	**58.1**	-0.5
R174	**52.2**	**51.8**	-0.4
R175	**53.7**	**53.2**	-0.5
R176	**50.9**	**50.4**	-0.5
R177	38.3	37.9	-0.4
R178	35.2	34.9	-0.3
R191	**46.8**	**46.4**	-0.4
R192	**45.8**	**45.3**	-0.5
R193	38.2	37.9	-0.3
R194	**40.5**	**40.2**	-0.3
R195	37.6	37.3	-0.3
R196	38.8	38.6	-0.2
R197	**45.2**	**44.8**	-0.4
R198	36.9	36.6	-0.3
R199	**43.6**	**43.2**	-0.4
R20	38.9	38.8	-0.1
R200	**43.1**	**42.6**	-0.5
R201	**41.2**	**40.8**	-0.4
R202	**42.2**	**41.8**	-0.4
R203	**41.8**	**41.3**	-0.5
R204	**53.3**	**52.7**	-0.6
R205	**45.9**	**45.0**	-0.9
R206	**43.5**	**43.1**	-0.4
R207	**53.3**	**52.7**	-0.6
R208	**46.7**	**46.3**	-0.4
R209	38.4	37.8	-0.6
R21	35.9	35.6	-0.3
R210	**46.4**	**44.9**	-1.5
R211	**47.0**	**44.9**	-2.1

Receptor Name	**Reference Case Modelled Annual Mean NO_2 (µg/m³) 2021**	**Assessed Case Annual Mean NO_2 (µg/m³) 2021**	**Change (with Scheme – without Scheme)**
R212	39.4	38.2	-1.2
R213	37.2	36.5	-0.7
R214	**43.6**	**42.6**	-1.0
R215	**49.3**	**48.2**	-1.1
R216	**51.7**	**49.6**	-2.1
R217	**47.6**	**46.1**	-1.5
R218	**41.2**	39.8	-1.4
R219	**49.2**	**47.1**	-2.1
R22	37.3	37.5	0.2
R220	**55.9**	**53.9**	-2.0
R221	**56.3**	**53.6**	-2.7
R222	**54.0**	**49.8**	-4.2
R223	**51.5**	**46.5**	-5.0
R224	**76.5**	**65.5**	-11.0
R225	**50.3**	**46.9**	-3.4
R226	29.8	30.9	1.1
R227	**48.6**	**46.6**	-2.0
R228	**45.3**	**45.0**	-0.3
R229	**61.6**	**60.8**	-0.8
R230	**41.4**	**41.2**	-0.2
R233	**44.8**	**44.5**	-0.3
R236	**50.1**	**48.0**	-2.1
R237	**45.5**	**43.4**	-2.1
R238	**53.6**	**51.1**	-2.5
R239	**45.7**	**44.6**	-1.1
R240	**44.3**	**43.8**	-0.5
R241	**52.0**	**50.4**	-1.6
R242	**48.2**	**46.9**	-1.3
R243	**53.1**	**52.2**	-0.9

Receptor Name	**Reference Case Modelled Annual Mean NO_2 (µg/m³) 2021**	**Assessed Case Annual Mean NO_2 (µg/m³) 2021**	**Change (with Scheme – without Scheme)**
R244	**45.3**	**44.5**	-0.8
R250	**60.5**	**60.2**	-0.3
R251	**59.3**	**59.1**	-0.2
R252	**64.7**	**64.6**	-0.1
R253	**89.7**	**89.2**	-0.5
R254	**54.5**	**54.4**	-0.1
R255	**59.7**	**59.2**	-0.5
R27	31.0	31.4	0.4
R30	35.0	35.4	0.4
R31	33.5	33.9	0.4
R45	34.3	33.9	-0.4
R46	**40.0**	39.2	-0.8
R47	**42.0**	**40.6**	-1.4
R49	**55.2**	**55.2**	0.0
R50	35.7	35.4	-0.3
R51	**61.7**	**61.3**	-0.4
R59	32.8	33.1	0.3
R60	29.2	29.6	0.4
R61	29.0	29.2	0.2
R62	32.5	32.1	-0.4
R63	**51.8**	**51.6**	-0.2
R64	37.2	37.1	-0.1
R65	35.4	35.3	-0.1
R66	37.8	37.6	-0.2
R67	38.8	38.6	-0.2
R68	**42.5**	**42.1**	-0.4
R69	**42.3**	**42.2**	-0.1
R70	39.5	39.3	-0.2
R71	**46.9**	**46.5**	-0.4

Receptor Name	**Reference Case Modelled Annual Mean NO_2 (µg/m³) 2021**	**Assessed Case Annual Mean NO_2 (µg/m³) 2021**	**Change (with Scheme – without Scheme)**
R72	**41.3**	**41.0**	-0.3
R73	**40.8**	**40.6**	-0.2
R74	37.2	37.0	-0.2
R75	32.5	32.4	-0.1
R76	33.2	33.1	-0.1
R77	30.8	30.6	-0.2
R78	**40.9**	**40.7**	-0.2
R79	28.5	28.4	-0.1
R80	25.0	25.0	0.0
R81	27.0	26.9	-0.1
R82	27.5	27.4	-0.1
R83	30.1	29.9	-0.2
R84	35.0	34.8	-0.2
R85	26.0	26.0	0.0
R86	27.8	27.7	-0.1
R87	32.0	31.9	-0.1
R94	34.3	34.3	0.0
R95	30.2	30.1	-0.1
R96	32.7	32.4	-0.3
R96a	30.3	30.2	-0.1
R97	**40.7**	**40.4**	-0.3
R98	**47.6**	**47.1**	-0.5
R99	36.9	36.6	-0.3

6.6.3 The results show that many of the receptors exceed the AQS annual mean objective of 40µg/m^3 in the future Baseline (reference case 2021). The results of the modelling indicate that the Scheme causes both improvements and deteriorations in air quality at sensitive receptors due to changes in traffic as a result of the Scheme. Drawing 6-8 shows the nature of the concentration change at those receptors which are expected to exceed the AQS objective for annual mean NO_2 in either the reference case or assessed case scenarios. The results indicate that there are more receptors which experience an improvement in air quality than a deterioration.

6.6.4 Table 6-15 indicates that receptors in the vicinity of the A12/A13 in Poplar would experience an improvement in air quality. The largest improvement is at R224 where the NO_2 concentration decreases by 11 µg/m^3. Most of the receptors in this area show decreases of 1-5 µg/m^3 and despite improvement, the majority of receptors are predicted to still exceed the annual mean AQS objective for NO_2, in the assessed case. The highest concentration at these receptors is predicted to be 65.5 µg/m^3 (R224). The improvements at these receptors are as a result of the reduction in traffic flows along the A12 Blackwall Tunnel Northern Approach. AADT flows are approximately 19,000 vehicles lower across the north and southbound carriageways of the Northern Approach with the implementation of the Scheme. HDV flows reduce by approximately 1,400 vehicles per day and average daily speed increases by approximately 10kph. As flows in the Blackwall Tunnel itself are reduced, emissions from the tunnel portals at Blackwall therefore also decrease.

6.6.5 Additionally westbound flows along the A13 East India Dock Road which feeds into and crosses the A12 show an increase in speed by approximately 30kph in the PM peak which represents less congested conditions than the reference case scenario.

6.6.6 Decreases of <1 µg/m^3 are predicted at receptors along the section of the A12 between the B125 and the A102. Most receptors in this area are predicted to exceed the annual mean AQS objective. The highest concentration predicted at receptors along this section is 52.7 µg/m^3 (R204). The changes in traffic along this section are much smaller than those roads which are in the vicinity of the northern portals of the Blackwall Tunnel. The southern part of the aforementioned section of the A12 shows decreases of approximately 1,000 AADT and 430 HDVs. AADT reductions are smaller further along the A12 and, as a result, the change in annual mean NO_2 concentrations is also smaller.

6.6.7 The range of change in concentrations in annual mean NO_2 at receptors located along the A13 between the Canning Town roundabout and the North Circular (A406) is between -0.1 and -0.7 µg/m^3. Concentrations at receptors in this area generally exceed the annual mean AQS objective of 40 µg/m^3. The highest concentration at a receptor in this area is 53 µg/m^3 (R157). The decrease in NO_2 concentrations can be explained by a reduction in HDV flow of approximately -250 vehicles per day. Additionally average speeds increase by 7-9 kph indicating a slight reduction in congestion.

6.6.8 On the A13 east of the North Circular (A406), the change in predicted concentrations of NO_2 ranges between -0.2 and -0.7 µg/. Concentrations at receptors in this area that are within 20m of the A13 generally exceed the annual mean AQS objective of 40 µg/m^3. The highest predicted concentration at receptors modelled in this area is 51.6 µg/m^3 (R119). The decreases in NO_2 concentrations at receptors is a result of a reduction in AADT flow of between 1,000 and 2,300 vehicles per day. Although peak hour speeds do not change, average daily speed is expected to increase by 10-14kph suggesting less congested conditions in the inter peak or off peak periods. This improves emissions in these periods.

6.6.9 As a result of the Scheme, receptors located in the area encompassing Silvertown south of the A13 around the Royal Docks are predicted to experience a deterioration in air quality. The largest deterioration in air quality is predicted at the ground floors of the Hoola development (FD9) next to the roundabout linking Silvertown Way, Tidal Basin Road and Lower Lea crossing where there is a predicted increase of 4.9 µg/m^3 annual mean NO_2 with the implementation of the Scheme. The development is located near to the northern portals and feeder roads of the proposed Silvertown Tunnel. The Tunnel itself is predicted to carry approximately 10,000-11,000 vehicles per day in each direction. The Hoola development is currently the nearest receptor to the northern portal of the tunnel and the associated roundabout infrastructure is therefore subject to the largest change in traffic.

6.6.10 Concentrations of NO_2 at the other worst-case receptors in the Royal Docks area are predicted to increase by up to 1.7 µg/m^3. Predicted total NO_2 concentrations at worst-case receptors in Silvertown in 2021 are all below 38.3 µg/m^3 (with the exception of FD9 as discussed above) as traffic flows are generally much lower than those locations close to the A13 and the A12.

6.6.11 The reassigned traffic introduced from the proposed Silvertown Tunnel disperses across Silvertown via the Lower Lea Crossing, A1011 Silvertown Way/North Woolwich Road, and the A1020 through Royal Albert Way to the Beckton roundabout. The Lower Lea crossing is predicted to have the largest reassignment in traffic (on an existing road) as AADT flow increases by 4,000 vehicles per day; however, there are no existing receptors next to the Lower Lea crossing that would be affected by the associated increase in emissions. AADT and HDV flow increases by approximately 1,600 and 400 respectively on the A1020 between the Silvertown roundabout and the Gallions reach roundabout (A13). This is predicted to increase concentrations at existing receptors by less than 1 µg/m^3. It is noted that a proportion of the HDV increases will be attributable to new bus links that TfL are planning run through the area once the Scheme is operational.

6.6.12 Predicted concentrations at worst-case receptors on the Greenwich Peninsula are below the AQS objective for annual mean NO_2 at all modelled receptors apart from those receptors close to the A102 Blackwall Tunnel Southern Approach. Increases range between 0.2-2.6 $\mu g/m^3$ at five receptors within 300m of the Silvertown tunnel southern portal. This is due to the alignment of the proposed roads which feed into the Scheme reducing the effective distance between source and receptor. However, it should be noted that all of these receptor points are future receptors where the modelled point was located on the red line boundary of the proposed development which extends to the existing kerb of the roads. The actual locations of future receptors are likely to be located further back from the existing kerb and therefore concentrations are likely to be lower than reported. There is an increase of approximately 250 HDVs along the Pilot Busway which runs up the Greenwich Peninsula which is also a contributor to the increase in concentrations. This is partially attributable to the new bus routes which TfL are planning to run following the implementation of the Scheme. Concentrations at receptors close to the A102 Blackwall approach itself are predicted to decrease by up to 3.5 $\mu g/m^3$ with the implementation of the Scheme. This is attributable to decreases in HDV flow of approximately 620 vehicles per day.

6.6.13 The A102 south of the Greenwich Peninsula becomes the A2 in the Kidbrooke area. Changes in concentration along this section are minimal (0 to -0.4 $\mu g/m^3$). This is attributed to a reduction in HDV flow of approximately -350 vehicles per day. This is also the case for those worst-case receptors located along the A2 between Kidbrooke and the A220 interchange in Bexley. This is due to the change in traffic along these sections of roads, which is marginally above the criteria for assessment (approximately -220 HDVs). There are other marginal decreases near to the Rotherhithe Tunnel in Rotherhithe and Limehouse due to a small increase in daily speed and a reduction of approximately 200 HDVs.

6.6.14 As previously stated, a definitive judgement on the impact of the Scheme on local air quality will be made in the ES when the further work detailed in section 6.8 is carried out and all receptors within 200m (which are likely to exceed the AQS Objectives) of the ARN are modelled. This will allow the application of Highways England IAN 174/13 to assess Scheme significance.

PM_{10}/$PM_{2.5}$

6.6.15 Table 6-16 presents the reference and assessed case concentrations for PM_{10} and $PM_{2.5}$.

Table 6-16 Modelled annual mean PM_{10}/$PM_{2.5}$ concentrations in reference and assessed case (2021)

Receptor Name	Reference Case PM_{10} (µg/m³) 2021	Assessed Case PM_{10} (µg/m³) 2021	Change in PM_{10} (with Scheme – without Scheme)	Reference Case $PM_{2.5}$ (µg/m³) 2021	Assessed Case $PM_{2.5}$ (µg/m³) 2021	Change in $PM_{2.5}$ (with Scheme – without Scheme)
AQS Objective	**40**	**40**	**-**	**25**	**25**	**-**
FD1	24.3	24.0	-0.2	18.2	18.1	-0.1
FD10	20.6	20.8	0.1	15.9	16.0	0.1
FD12	20.9	20.9	0.1	16.1	16.1	0.0
FD13	21.8	21.8	0.0	16.6	16.6	0.0
FD14	21.3	21.4	0.0	16.3	16.3	0.0
FD17	21.8	21.4	-0.4	16.6	16.3	-0.2
FD18	20.4	20.5	0.1	15.7	15.7	0.0
FD19	20.6	20.8	0.2	15.8	16.0	0.1
FD2	25.2	24.4	-0.8	18.8	18.3	-0.5
FD20	20.8	20.8	0.0	15.9	15.9	0.0
FD21	20.3	20.3	0.0	15.6	15.6	0.0
FD22	20.2	20.2	0.0	15.6	15.6	0.0
FD23	20.8	20.7	0.0	15.9	15.9	0.0
FD24	20.7	20.7	0.0	15.9	15.9	0.0
FD25	20.9	20.9	0.0	16.0	16.0	0.0
FD26	21.8	21.7	0.0	16.6	16.5	0.0
FD27	20.1	20.1	0.0	15.5	15.5	0.0
FD3	24.7	24.5	-0.2	18.4	18.3	-0.1
FD4	22.9	22.8	-0.1	17.3	17.2	0.0
FD5	23.4	23.2	-0.2	17.6	17.5	-0.1
FD6	20.7	20.7	0.0	15.9	15.9	0.0
FD9	21.2	21.7	0.5	16.3	16.6	0.3
R100	20.2	20.1	0.0	15.4	15.4	0.0

Receptor Name	Reference Case PM_{10} (µg/m³) 2021	Assessed Case PM_{10} (µg/m³) 2021	Change in PM_{10} (with Scheme – without Scheme)	Reference Case $PM_{2.5}$ (µg/m³) 2021	Assessed Case $PM_{2.5}$ (µg/m³) 2021	Change in $PM_{2.5}$ (with Scheme – without Scheme)
R116	20.3	20.2	0.0	15.5	15.5	0.0
R117	20.5	20.5	0.0	15.7	15.7	0.0
R118	21.0	21.0	0.0	16.0	16.0	0.0
R119	22.7	22.7	-0.1	17.1	17.1	0.0
R120	22.2	22.2	0.0	16.8	16.8	0.0
R121	21.9	21.8	0.0	16.5	16.5	0.0
R122	23.3	23.3	-0.1	17.4	17.3	-0.1
R123	22.0	22.0	0.0	16.6	16.6	0.0
R124	22.2	22.1	0.0	16.8	16.7	0.0
R125	22.5	22.4	0.0	16.9	16.9	0.0
R126	21.8	21.8	0.0	16.5	16.5	0.0
R127	18.8	18.8	0.0	14.7	14.7	0.0
R128	19.2	19.2	0.0	14.9	14.9	0.0
R129	19.2	19.2	0.0	15.0	15.0	0.0
R130	19.4	19.4	0.0	15.1	15.1	0.0
R131	19.1	19.1	0.0	15.0	15.0	0.0
R132	18.9	18.9	0.0	14.8	14.8	0.0
R133	18.8	18.8	0.0	14.8	14.8	0.0
R134	19.0	19.0	0.0	14.9	14.9	0.0
R139	19.2	19.2	0.0	15.0	15.0	0.0
R140	19.3	19.3	0.0	15.0	15.0	0.0
R141	19.0	19.0	0.0	14.9	15.0	0.0
R142	18.8	18.9	0.0	14.8	14.8	0.0
R143	19.6	19.7	0.0	15.3	15.3	0.0
R144	22.1	22.1	0.0	16.7	16.7	0.0
R145	22.1	22.1	0.0	16.8	16.7	0.0

Receptor Name	Reference Case PM_{10} (µg/m³) 2021	Assessed Case PM_{10} (µg/m³) 2021	Change in PM_{10} (with Scheme – without Scheme)	Reference Case $PM_{2.5}$ (µg/m³) 2021	Assessed Case $PM_{2.5}$ (µg/m³) 2021	Change in $PM_{2.5}$ (with Scheme – without Scheme)
R146	21.7	21.7	0.0	16.5	16.5	0.0
R147	22.0	22.0	0.0	16.7	16.7	0.0
R148	21.2	21.2	0.0	16.2	16.2	0.0
R149	21.2	21.2	0.0	16.2	16.2	0.0
R150	21.4	21.3	0.0	16.3	16.3	0.0
R154	22.6	22.6	-0.1	17.1	17.1	0.0
R155	22.5	22.5	0.0	17.0	17.0	0.0
R156	23.1	23.1	-0.1	17.4	17.4	0.0
R157	23.5	23.4	-0.1	17.6	17.6	0.0
R158	21.8	21.8	0.0	16.6	16.5	0.0
R159	23.2	23.2	-0.1	17.5	17.5	0.0
R160	22.1	22.1	0.0	16.8	16.8	0.0
R161	22.5	22.5	0.0	17.1	17.0	0.0
R162	22.9	22.8	0.0	17.3	17.3	0.0
R163	21.4	21.4	0.0	16.4	16.4	0.0
R164	19.5	19.5	0.1	14.9	15.0	0.0
R165	19.7	19.7	0.0	15.1	15.1	0.0
R168	22.0	22.0	0.0	16.6	16.6	0.0
R169	21.3	21.3	0.0	16.2	16.2	0.0
R170	21.7	21.7	0.0	16.4	16.4	0.0
R172	22.1	22.1	0.0	16.6	16.6	0.0
R173	22.4	22.4	0.0	16.8	16.8	0.0
R174	22.0	22.0	0.0	16.5	16.5	0.0
R175	22.1	22.1	0.0	16.6	16.6	0.0
R176	21.9	21.9	0.0	16.5	16.5	0.0
R177	21.3	21.3	0.0	16.1	16.1	0.0

Receptor Name	Reference Case PM_{10} (µg/m³) 2021	Assessed Case PM_{10} (µg/m³) 2021	Change in PM_{10} (with Scheme – without Scheme)	Reference Case $PM_{2.5}$ (µg/m³) 2021	Assessed Case $PM_{2.5}$ (µg/m³) 2021	Change in $PM_{2.5}$ (with Scheme – without Scheme)
R178	20.6	20.6	0.0	15.7	15.7	0.0
R191	22.5	22.4	0.0	17.0	16.9	0.0
R192	22.4	22.4	0.0	16.9	16.9	0.0
R193	23.1	23.1	0.0	17.4	17.4	0.0
R194	23.3	23.3	0.0	17.5	17.5	0.0
R195	23.1	23.1	0.0	17.4	17.3	0.0
R196	23.1	23.1	0.0	17.4	17.3	0.0
R197	23.3	23.3	0.0	17.5	17.5	0.0
R198	23.0	23.0	0.0	17.3	17.3	0.0
R199	23.6	23.6	0.0	17.7	17.7	0.0
R20	20.5	20.5	0.0	15.7	15.8	0.0
R200	23.3	23.2	0.0	17.4	17.4	0.0
R201	23.1	23.1	0.0	17.3	17.3	0.0
R202	23.1	23.1	0.0	17.3	17.3	0.0
R203	23.0	23.0	0.0	17.2	17.2	0.0
R204	23.7	23.7	-0.1	17.7	17.7	0.0
R205	22.6	22.6	-0.1	17.2	17.2	-0.1
R206	22.4	22.4	0.0	17.1	17.1	0.0
R207	23.0	23.0	-0.1	17.5	17.4	0.0
R208	22.7	22.7	0.0	17.3	17.2	0.0
R209	22.7	22.7	0.0	17.2	17.2	0.0
R21	20.3	20.3	0.0	15.6	15.6	0.0
R210	23.4	23.3	-0.1	17.6	17.5	0.0
R211	23.4	23.3	-0.1	17.6	17.6	-0.1
R212	22.6	22.6	0.0	17.1	17.1	0.0
R213	22.4	22.4	0.0	17.0	17.0	0.0

Receptor Name	Reference Case PM_{10} (µg/m³) 2021	Assessed Case PM_{10} (µg/m³) 2021	Change in PM_{10} (with Scheme – without Scheme)	Reference Case $PM_{2.5}$ (µg/m³) 2021	Assessed Case $PM_{2.5}$ (µg/m³) 2021	Change in $PM_{2.5}$ (with Scheme – without Scheme)
R214	23.2	23.1	-0.1	17.5	17.4	0.0
R215	23.8	23.7	-0.1	17.8	17.8	0.0
R216	23.7	23.6	-0.1	17.8	17.7	-0.1
R217	23.0	23.0	-0.1	17.4	17.3	-0.1
R218	22.7	22.6	-0.1	17.2	17.1	0.0
R219	23.2	23.1	-0.1	17.5	17.4	-0.1
R22	20.4	20.4	0.0	15.7	15.7	0.0
R220	23.6	23.5	-0.1	17.8	17.7	-0.1
R221	23.8	23.6	-0.2	17.9	17.7	-0.1
R222	23.6	23.4	-0.3	17.8	17.6	-0.2
R223	23.3	23.0	-0.3	17.6	17.4	-0.2
R224	25.9	24.9	-1.0	19.2	18.6	-0.6
R225	23.2	23.0	-0.2	17.5	17.4	-0.1
R226	20.6	20.6	0.1	15.9	15.9	0.0
R227	23.0	22.9	-0.1	17.4	17.3	-0.1
R228	22.7	22.6	0.0	17.2	17.1	0.0
R229	23.4	23.4	-0.1	17.7	17.7	0.0
R230	22.0	22.0	0.0	16.8	16.8	0.0
R233	21.2	21.2	0.0	16.3	16.3	0.0
R236	23.2	23.1	-0.1	17.5	17.4	-0.1
R237	22.5	22.3	-0.1	17.0	17.0	-0.1
R238	22.9	22.7	-0.2	17.3	17.2	-0.1
R239	22.5	22.4	-0.1	17.0	17.0	0.0
R240	22.4	22.4	0.0	17.0	17.0	0.0
R241	23.1	23.0	-0.1	17.4	17.4	-0.1
R242	22.9	22.9	-0.1	17.3	17.3	0.0

Receptor Name	**Reference Case PM_{10} (µg/m³) 2021**	**Assessed Case PM_{10} (µg/m³) 2021**	**Change in PM_{10} (with Scheme – without Scheme)**	**Reference Case $PM_{2.5}$ (µg/m³) 2021**	**Assessed Case $PM_{2.5}$ (µg/m³) 2021**	**Change in $PM_{2.5}$ (with Scheme – without Scheme)**
R243	21.4	21.3	-0.1	16.4	16.4	0.0
R244	21.1	21.0	0.0	16.2	16.2	0.0
R250	23.6	23.6	0.0	17.7	17.7	0.0
R251	23.5	23.5	0.0	17.7	17.7	0.0
R252	24.2	24.2	0.0	18.1	18.1	0.0
R253	25.6	25.6	-0.1	19.1	19.0	0.0
R254	23.0	23.0	0.0	17.3	17.3	0.0
R255	23.4	23.3	0.0	17.6	17.5	0.0
R27	19.6	19.6	0.0	15.2	15.2	0.0
R30	20.2	20.2	0.0	15.5	15.6	0.0
R31	20.1	20.1	0.0	15.5	15.5	0.0
R45	20.8	20.8	0.0	16.0	16.0	0.0
R46	21.2	21.1	0.0	16.2	16.2	0.0
R47	21.3	21.3	0.0	16.3	16.3	0.0
R49	22.5	22.5	0.0	17.1	17.0	0.0
R50	21.1	21.1	0.0	16.2	16.2	0.0
R51	23.3	23.2	-0.1	17.6	17.5	0.0
R59	20.6	20.6	0.0	15.9	15.9	0.0
R60	20.2	20.2	0.0	15.6	15.6	0.0
R61	20.2	20.2	0.0	15.6	15.6	0.0
R62	20.5	20.5	0.0	15.8	15.8	0.0
R63	22.7	22.7	-0.1	17.2	17.2	0.0
R64	21.6	21.6	0.0	16.5	16.5	0.0
R65	21.4	21.4	0.0	16.3	16.3	0.0
R66	21.7	21.7	0.0	16.5	16.5	0.0
R67	21.7	21.7	0.0	16.5	16.5	0.0

Receptor Name	Reference Case PM_{10} (µg/m³) 2021	Assessed Case PM_{10} (µg/m³) 2021	Change in PM_{10} (with Scheme – without Scheme)	Reference Case $PM_{2.5}$ (µg/m³) 2021	Assessed Case $PM_{2.5}$ (µg/m³) 2021	Change in $PM_{2.5}$ (with Scheme – without Scheme)
R68	22.0	21.9	-0.1	16.7	16.6	0.0
R69	22.1	22.0	0.0	16.8	16.7	0.0
R70	20.8	20.8	0.0	15.9	15.9	0.0
R71	22.6	22.5	-0.1	17.1	17.0	0.0
R72	21.8	21.8	0.0	16.6	16.6	0.0
R73	21.4	21.3	-0.1	16.3	16.3	0.0
R74	20.8	20.8	0.0	15.9	15.9	0.0
R75	20.5	20.5	0.0	15.7	15.7	0.0
R76	20.6	20.6	0.0	15.8	15.8	0.0
R77	19.4	19.3	0.0	15.0	15.0	0.0
R78	20.4	20.4	0.0	15.7	15.7	0.0
R79	20.6	20.6	0.0	15.7	15.7	0.0
R80	20.3	20.3	0.0	15.5	15.5	0.0
R81	20.4	20.4	0.0	15.6	15.6	0.0
R82	20.6	20.6	0.0	15.7	15.7	0.0
R83	20.8	20.8	0.0	15.9	15.9	0.0
R84	20.9	20.9	0.0	15.9	15.9	0.0
R85	20.3	20.3	0.0	15.6	15.6	0.0
R86	20.5	20.5	0.0	15.7	15.7	0.0
R87	19.4	19.4	0.0	15.0	15.0	0.0
R94	20.1	20.0	0.0	15.4	15.4	0.0
R95	19.5	19.5	0.0	15.1	15.1	0.0
R96	19.8	19.8	0.0	15.3	15.3	0.0
R96a	19.4	19.3	0.0	15.0	15.0	0.0
R97	20.5	20.4	-0.1	15.7	15.7	0.0
R98	21.6	21.5	-0.1	16.4	16.4	-0.1

Receptor Name	Reference Case PM_{10} (µg/m³) 2021	Assessed Case PM_{10} (µg/m³) 2021	Change in PM_{10} (with Scheme – without Scheme)	Reference Case $PM_{2.5}$ (µg/m³) 2021	Assessed Case $PM_{2.5}$ (µg/m³) 2021	Change in $PM_{2.5}$ (with Scheme – without Scheme)
R99	19.8	19.8	0.0	15.3	15.3	0.0

6.6.16 The maximum concentration in either of the reference case or assessed case scenarios for PM_{10} is 25.9 µg/m^3. This is well below the annual mean AQS objective of 40 µg/m^3. The largest increase in PM_{10} is 0.5 µg/m^3 at FD9 (Hoola development), this is the only receptor with a perceptible increase (>0.4 µg/m^3) in PM_{10}. Only two receptors (FD2 and R224) were predicted to have a perceptible decrease (<-0.4 µg/m^3). In the base year 2012, no modelled receptors exceeded the AQS 24 hour mean objective for PM_{10}. The base year modelled results showed no exceedence of the 24 hour objective for PM_{10} and, as all assessed case concentrations are lower than the base year concentrations, any exceedence of the 24 hour AQS objective can be ruled out.

6.6.17 Modelled concentrations of $PM_{2.5}$ are all below the annual mean objective of 25 µg/m^3. Changes in $PM_{2.5}$ are minimal, with only FD2 and R224 predicted to experience a perceptible change, as both decrease by -0.5 µg/m^3.

<u>Summary of likely significant effects on Local Air Quality</u>

6.6.18 The air quality modelling results show that the implementation of the Scheme results in a change in air quality, with both improvements and deteriorations in local air quality. However, more receptors experience an improvement in air quality.

6.6.19 Out of all the receptors modelled, 89 of the 179 were predicted to exceed the AQS objective for annual mean NO_2 in the opening year of 2021 with the implementation of the Scheme. 72 of the receptors were predicted to decrease by more than 0.4 µg/m^3 (i.e. a perceptible change) with the Scheme, 15 of the receptors were predicted to increase by more than 0.4 µg/m^3.

6.6.20 Nine of the receptors have assessed case concentrations greater than 60 µg/m^3, therefore exceedence of the hourly AQS objective is possible. The impact of the Scheme on PM_{10} and $PM_{2.5}$ concentrations is predicted to be generally imperceptible.

6.6.21 It must be noted that the findings are indicative and a definitive evaluation of the significance of effects of the Scheme on local air quality cannot be made until all receptors within 200m of affected roads are modelled. This information will be presented in the ES submitted with the DCO application.

Compliance Risk

6.6.22 As is the case for the assessment of local air quality, the full compliance assessment carried out in accordance with IAN 175/13 will be presented in the ES. An indicative compliance risk assessment was carried out on the basis of the receptors considered for this assessment. It indicates that it is unlikely that the Scheme will delay the Greater London agglomeration from achieving compliance with EU Limit Values as the areas that are predicted by Defra to be the highest concentrations in the zone won’t be affected by the Scheme. According to the current PCM modelled data the maximum modelled concentration in the Greater London Urban Area (the zone the scheme resides within) is Marylebone Road (annual mean NO_2 78.6µg/m³ in 2020) which is not affected by the scheme. The highest PCM modelled links in the study area is a link modelled close to Blackwell Tunnel (annual mean NO_2 67.2µg/m³ in 2020) on East India Dock Road. The nearest receptor to this link is expected to show a decrease in NO_2 concentration.

6.6.23 As discussed, Defra are in the process of consulting on their updated action plans as directed by the Supreme Court. The maximum modelled concentration reported in the consultation is lower in 2020 (71 µg/m³) than has previously reported. Should these consulted values be published the updated Defra modelling data will be used to undertake the compliance risk assessment in the ES.

6.7 Cumulative Impacts

6.7.1 The air quality assessment is inherently cumulative as all committed developments are included in the traffic model. The air quality assessment therefore provides the predicted cumulative impact of the proposed Scheme in combination with other committed developments in the area. Chapter 17 of this document discusses cumulative effects of the Scheme and covers the traffic data upon which the air quality assessment was based.

6.8 Further Work to be done

6.8.1 IAN 185/15 has been issued and the methodology contained within it will be incorporated into the traffic data produced for the air quality assessment in the ES. The application of speed banding, means that modelled speeds require further scrutiny before use in dispersion models including the following:

- Analysis of the performance of modelled traffic speeds on individual road links compared against observed speeds on the same road links;
- Speed-Pivot and adjust modelled traffic speeds on individual road links to better reflect observed speeds where required;
- Assign speed-band category to individual road links by road type; and
- Identify the corresponding NO_x, PM_{10} and CO_2 emission rates for use in the various air quality assessments.

6.8.2 Speed pivoting can only be applied to links with observed data, and so speeds will be provided separately on relevant links, averaged on others. In large urban areas such as Greater London, the speed-banding method is very sensitive to the banding selection.

6.8.3 Under IAN 185/15 congestion around junctions is considered using the appropriate speed band on links within 100 metres of relevant junctions in the ARN. All roads in the localised air quality assessment study area will be speed banded for the ES. It is likely that the speed banding of the base year traffic data will change the verification factors that have been calculated for the PEIR (Appendix 6.A), and therefore the results presented in the ES will vary from those present in the PEIR.

6.8.4 Additionally the modelling and evaluation of significant effects on **all receptors** (rather than just worst-case receptors) will be carried out for presentation in the ES. This will form the basis of the local air quality significance judgement detailed in HA IAN 174/13.

6.9 NPS compliance

6.9.1 Please refer to Appendix 1.A, NN NPS Compliance, in Volume 3 of this PEIR.

6.10 Summary

6.10.1 The operational impact of the proposed Scheme on local air quality has been assessed by undertaking air quality modelling of the reference case and assessed case. The traffic data has been screened against the assessment criteria detailed in DMRB HA207/07 Volume 11 Section 3 Part 1. The study area incorporated approximately 50km of the road network in east London, covering sections of the A13, A12, A2, A1, A102, A1203, A1020, and A282.

6.10.2 Base year monitored and modelled concentrations indicated that the study area was subject to existing poor air quality particularly for NO_2. Traffic data for the reference case and assessed case (2021) has been used to generate temporal period-specific emission rates which have been modelled in ADMS-Roads. The modelled output has been verified using existing monitoring data. Worst-case receptors have been identified at locations where air pollutant concentrations are expected to be highest, and the Scheme induced change in pollutant concentration is expected to be greatest. Exceedences of the annual mean AQS objective for NO_2 are widespread in the reference case (future Baseline), which is expected given the locality of the Scheme.

6.10.3 The implementation of the Scheme is predicted to result in both improvements and deterioration in air quality at worst-case receptors. In general there are more receptors where concentrations of NO_2, PM_{10} and $PM_{2.5}$ are predicted to improve than receptors where concentrations are predicted to deteriorate.

6.10.4 A definitive judgement has not been made in terms of the overall significance of the Scheme in the operational phase as all receptors will need to be modelled in line with the current guidance (particularly in relation to incorporating IAN 185/15 into the modelling methodology).

6.10.5 A definitive judgement will be made in the ES when the air quality modelling has been updated to take account of the speed banding of the traffic data once this process has been completed, and once all receptors (rather than worst-case receptors only as currently presented) in the ARN network are modelled. The results also indicate that the risk the Scheme will delay compliance with the EU directive is low, this will be confirmed in the ES.

6.10.6 The ES will also incorporate ecological receptors, the construction phase impacts and the impact on regional air quality.