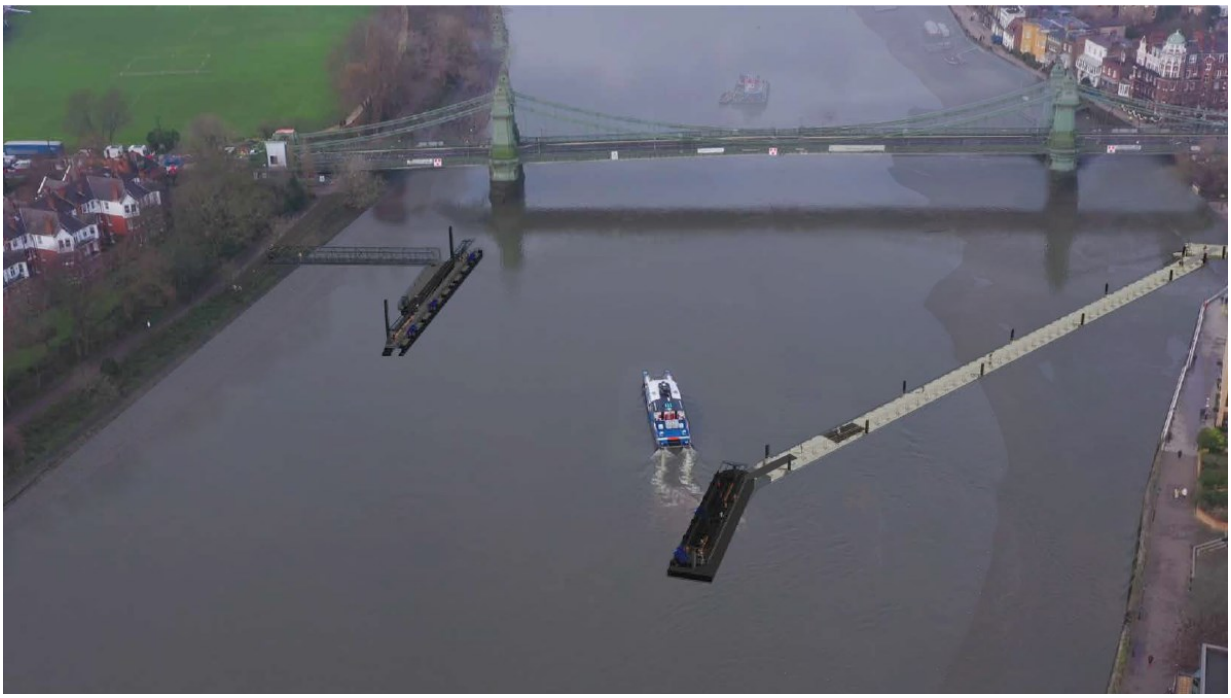
Transport for London

Hammersmith Temporary Ferry Service

Planning Application

Air Quality Assessment



Air Quality CONSULTANTS

Date: May 2021
Report Ref: J10-12312A-10

Revision Record

Rev	Description	Date	Originator	Checker	Approver
F1		10/05/2021	L Armstrong (AQC)	P Wilson (AQC)	P Wilson (AQC)
F2		13/05/2021	L Armstrong (AQC)	P Wilson (AQC)	P Wilson (AQC)

Prepared for:

Transport for London
Palestra
197 Blackfriars Road
London
SE1 8NJ

Prepared by:

Air Quality Consultants Ltd
119 Marylebone Road
London
NW1 5PU

Table of Contents

Figures

Tables

Appendices

List of Abbreviations

AADT – Annual Average Daily Traffic
AQC – Air Quality Consultants
AQAL – Air Quality Assessment Level
AQMA – Air Quality Management Area
AURN – Automatic Urban and Rural Network
CAZ – Clean Air Zone
CEMP – Construction Environmental Management Plan
Defra – Department for Environment, Food and Rural Affairs
DfT – Department for Transport
DMP – Dust Management Plan
EPUK – Environmental Protection UK
Exceedance – A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
EU – European Union
EV – Electric Vehicle
Focus Area – Location that not only exceeds the EU annual mean limit value for NO2 but also has a high level of human exposure
GLA – Greater London Authority
HDV – Heavy Duty Vehicles (> 3.5 tonnes)
HMSO – Her Majesty's Stationery Office
HGV – Heavy Goods Vehicle
IAQM – Institute of Air Quality Management
JAQU – Joint Air Quality Unit
LAQM – Local Air Quality Management
LB – London Borough
LDV – Light Duty Vehicles (<3.5 tonnes)
LEZ – Low Emission Zone
LGV – Light Goods Vehicle
$\mu g/m^3$ – Micrograms per cubic metre
NO_2 – Nitrogen dioxide
NPPF – National Planning Policy Framework
Objectives – A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV – Office for Low Emission Vehicles
PHV – Private Hire Vehicle
PM_{10} – Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$ – Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG – Planning Practice Guidance
RDE – Real Driving Emissions
SCR – Selective Catalytic Reduction
SPG – Supplementary Planning Guidance
Standards – A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal

TEA – Triethanolamine – used to absorb nitrogen dioxide
TfL – Transport for London
ULEZ – Ultra Low Emission Zone
ZEC – Zero Emission Capable

1 Introduction

1.1 Introduction

1.1.1 This Air Quality Assessment has been prepared by Air Quality Consultants Ltd on behalf of Thames Clippers for Transport for London (TfL), in support of full planning applications for a temporary ferry service spanning the River Thames between Hammersmith (on the north) and Barnes (on the south). This temporary ferry service will be in service while the Grade II* listed Hammersmith Bridge, which is closed to road traffic, undergoes repairs.

1.1.2 Full planning permission is sought for the development of the scheme under the Town and Country Planning Act 1990 (as amended). The two piers are formed of similar structures which seek to respond to the immediate surroundings and their interaction with the respective land site environments.

1.1.3 A brief summary of the proposed schemes is provided below. For additional detail please refer to the Design and Access Statement prepared by Beckett Rankine enclosed with this application.

Hammersmith and Fulham

1.1.4 The proposed Hammersmith Pier is to land on the slipway located at the end of Queen Caroline Street. The slipway is seldom used and is closed off with timber flood boards. Access to the pier is to be via a lightweight steel ramp which will span over the flood boards.

1.1.5 A 125m long modular floating walkway (using units by EZ Dock) will span between the flood defence wall and a second-hand barge, modified for use as a pier. The walkway will be restrained by 12 tubular piles of up to 0.5m diameter. The required piling is to be minimised to avoid major impacts and disturbance of the river environment.

1.1.6 The barge will be restrained by a pair of spud legs – these have been selected given their temporary nature and lesser impact when compared to piles. The pier is skewed downstream to facilitate passage of large vessels beneath Hammersmith bridge (the bridge is open for occasional navigation when no works are in progress on the bridge).

1.1.7 The Description of Development for the London Borough of Hammersmith and Fulham is as follows:

Erection of a new river pier, associated walkway and landing for a temporary period of up to three years for the purpose of providing a passenger and cyclist ferry service associated with the temporary closure of Hammersmith Bridge; the application also includes public realm works, including a new temporary pedestrian ramp for access, hard landscaping scheme, relocation of cycle parking and the reduction in height of the river wall.

Richmond

1.1.8 The proposed Barnes Pier is formed from the old Savoy pier, itself a temporary structure, which will be repurposed for this development. The pontoon will be modified such that is restrained by a pair of spud legs rather than its current radial arms to minimise impact on the foreshore.

1.1.9 Access to the pier is by a 35m aluminium linkspan, with clear width 2.5m, connecting to the landside tow path.

1.1.10 The towpath is located beneath flood defence level and floods on large tides. As part of the works, a 45m lightweight steel frame walkway will be installed to allow dry access to the pier, the clear width of this structure will be a minimum of 2.5m to suit segregated pedestrian and cycle traffic.

1.1.11 The Description of Development for the London Borough of Richmond upon Thames is as follows:

Erection of a new river pier, associated walkway and landing for a temporary period of up to three years for the purpose of providing a passenger and cyclist ferry service associated with the temporary closure of Hammersmith Bridge; the application also includes public realm works, including a new temporary pedestrian walkway and landscaping scheme.

1.2 Scope of the Assessment

1.2.1 The construction of the piers for the ferry service has been designed to minimise cumulative effects with the adjoining Hammersmith Bridge works and impacts on the local community, however, there would remain the potential to generate dust emissions which may impact nearby residential properties. The construction works may also lead to changes in vehicle flows on local roads, which may impact on air quality at nearby residential properties.

1.2.2 The proposed ferry service will be provided for pedestrians, cyclists, wheelchairs and mobility scooters. It is assumed that there could potentially be some operational traffic associated with the ferry service, in terms of drop off and pick up. However, this number is expected to be significantly less than traffic that would have been associated with the open Hammersmith Bridge, and there is the potential for reduced vehicle movements more generally due to the provision of the ferry service. It is, therefore, assumed that the scheme will not significantly affect traffic flows on the local road network and thus during its operational life there are judged to be no significant air quality impacts due to road traffic. As such, road traffic impacts during the operational phase are not considered further.

1.2.3 Access to the ferries will be via new piers reached by extended walkways into the river. Emissions from the ferries will, therefore, be at some distance from existing, sensitive receptors. The ferries are scheduled between 6:00-22:00 during weekdays at a frequency of 5- 7 minutes and 8:00-22:00 during weekends leaving every 10-12 minutes. The ferries will therefore be alongside the piers for short periods of time. In addition, the pier layout has been designed to making use of the tide to reduce engine load and thus emissions. The potential air quality impacts associated with the ferries are explores further.

1.2.4 The site on the northern side of the River Thames (hereafter called the "Hammersmith site") lies within a borough-wide Air Quality Management Area (AQMA) declared by the London Borough (LB) of Hammersmith and Fulham (LB Hammersmith and Fulham) for exceedances of the annual mean nitrogen dioxide (NO_2) and 24-hour mean PM_{10} objectives. The site on the southern side of the River Thames (hereafter called the "Barnes site") lies within a borough-wide Air Quality Management Area (AQMA) declared by the London Borough of Richmond upon Thames (LB Richmond) for exceedances of the annual mean nitrogen dioxide (NO_2) objective and 24-hour and annual mean PM_{10} objectives. The project will lead to changes in vehicle flows on local roads during the construction phase, which may impact on air quality at existing residential properties. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.2.5 The GLA has released Supplementary Planning Guidance on the Control of Dust and Emissions from Construction and Demolition (GLA, 2014b). The SPG outlines a risk assessment approach for construction dust assessment and helps determine the mitigation measures that will need to be applied. A construction dust assessment has been undertaken and the appropriate mitigation has been set out.

1.2.6 The Greater London Authority's (GLA's) London Plan (GLA, 2021) requires certain developments to be assessed in terms of their air quality neutrality. The Supplementary Planning Guidance (SPG) on Sustainable Design and Construction (GLA, 2014a) details the methodology for this assessment. However, the methodology is not designed to assess infrastructure projects and benchmarks have not been derived for these projects and therefore it is not possible to assess the air quality neutrality of the project.

1.2.7 This report describes baseline local air quality conditions and the anticipated duration of the works.

1.2.8 This report has been prepared taking into account all relevant local and national guidance and regulations.

2 Policy and Assessment Criteria

2.1.1 All European legislation referred to in this report is written into UK law and remains in place, although there is uncertainty at this point in time as to who will enforce the requirements of some of this legislation.

2.2 Air Quality Strategy

2.2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA) and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

2.3 Clean Air Strategy 2019

2.3.1 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government, in partnership with the Governments of Scotland, Wales and Northern Ireland, will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

2.4 Planning Policy

National Policies

2.4.1 The National Planning Policy Framework (NPPF) (2019a) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

2.4.2 To prevent unacceptable risks from air pollution, Paragraph 170 of the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality".

2.4.3 Paragraph 180 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".

2.4.4 More specifically on air quality, Paragraph 181 makes clear that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan".

2.4.5 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019b), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified".

2.4.6 Regarding plan-making, the PPG states:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality".

2.4.7 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan *"identifies measures that will be introduced in pursuit of the objectives and can have implications for planning". In addition, the PPG makes clear that "Odour and dust can also be a planning concern, for example, because of the effect on local amenity".*

2.4.8 Regarding the need for an air quality assessment, the PPG states that:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity".

2.4.9 The PPG sets out the information that may be required in an air quality assessment, making clear that:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific".

2.4.10 The PPG also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented."

London-Specific Policies

2.4.11 The key London-specific policies are summarised below, with more detail provided, where required, in Appendix A.

The London Plan

2.4.12 The London Plan (GLA, 2021) sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The key policy relating to air quality is Policy SI1 on Improving air quality, Part B1 of which sets out three key requirements for developments:

"Development proposals should not:
lead to further deterioration of existing poor air quality
create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits
create unacceptable risk of high levels of exposure to poor air quality".

2.4.13 The Policy then details how developments should meet these requirements, stating:

"In order to meet the requirements in Part 1, as a minimum:
development proposals must be at least Air Quality Neutral
development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1 development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure".

2.4.14 Part C of the Policy introduces the concept of Air Quality Positive for large-scale development, stating:

"Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating: how proposals have

considered ways to maximise benefits to local air quality, and what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this."

2.4.15 The proposed development is not large-scale development, thus an Air Quality Positive statement is not required.

2.4.16 Regarding construction and demolition impacts, Part D of Policy SI1 of the London Plan states:

"In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance".

2.4.17 Part E of Policy SI1 states the following regarding mitigation and offsetting of emissions:

"Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development".

2.4.18 The explanatory text around Policy SI1 of the London Plan states the following with regard to assessment criteria:

"The Mayor is committed to making air quality in London the best of any major world city, which means not only achieving compliance with legal limits for Nitrogen Dioxide as soon as possible and maintaining compliance where it is already achieved, but also achieving World Health Organisation targets for other pollutants such as Particulate Matter.

The aim of this policy is to ensure that new developments are designed and built, as far as is possible, to improve local air quality and reduce the extent to which the public are exposed to poor air quality. This means that new developments, as a minimum, must not cause new exceedances of legal air quality standards, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits. Where limit values are already met, or are predicted to be met at the time of completion, new developments must endeavour to maintain the best ambient air quality compatible with sustainable development principles.

Where this policy refers to 'existing poor air quality' this should be taken to include areas where legal limits for any pollutant, or World Health Organisation targets for Particulate Matter, are already exceeded and areas where current pollution levels are within 5 per cent of these limits".

London Environment Strategy

2.4.19 The London Environment Strategy was published in May 2018 (GLA, 2018a). The strategy considers air quality in Chapter 4; the Mayor's main objective is to create a "*zero emission London by 2050".* Policy 4.2.1 aims to "*reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport".* The strategy sets out the aim of achieving the World Health Organisation guideline for PM2.5 London-wide by 2030. An implementation plan for the strategy has also been published which sets out what the Mayor will do between 2018 and 2023 to help achieve the ambitions in the strategy.

Mayor's Transport Strategy

2.4.20 The Mayor's Transport Strategy (GLA, 2018b) sets out the Mayor's policies and proposals to reshape transport in London over the next two decades. The Strategy focuses on reducing car dependency and increasing active sustainable travel, with the aim of improving air quality and creating healthier streets. It notes that development proposals should *"be designed so that walking and cycling are the most appealing choices for getting around locally".*

GLA SPG: The Control of Dust and Emissions During Construction and Demolition

2.4.21 The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014b) outlines a risk assessment based approach to considering the potential for dust generation from a construction site, and sets out what mitigation measures should be implemented to minimise the risk of construction dust impacts, dependent on the outcomes of the risk assessment. This guidance is largely based on the Institute of Air Quality Management's (IAQM's) guidance (IAQM, 2016), and it states that "*the latest version of the IAQM Guidance should be used*".

Air Quality Focus Areas

2.4.22 The GLA has identified 187 air quality Focus Areas in London. These are locations that not only exceed the EU annual mean limit value for nitrogen dioxide, but also have high levels of human exposure. They do not represent an exhaustive list of London's air quality hotspot locations, but locations where the GLA believes the problem to be most acute. They are also areas where the GLA considers there to be the most potential for air quality improvements and are, therefore, where the GLA and Transport for London (TfL) will focus actions to improve air quality. The project is located within the 'Hammersmith Bridge Road at Castlenau' air quality Focus Area.

Local Policies

London Borough of Hammersmith and Fulham

2.4.23 The new Hammersmith and Fulham Local Plan (LB Hammersmith and Fulham, 2018a) was adopted in February 2018, and replaced the 2011 Core Strategy and the 2013 Local Plan. The Plan contains numerous policies and strategic objectives, some of which include some focus on air quality within the Borough. 'Policy CC10' specifically focuses on air quality, and states that:

"The council will seek to reduce the potential adverse air quality impacts of new developments by:

a. *requiring all developments which may be impacted by local sources of poor air quality or may adversely contribute to local air quality to provide an air quality assessment that considers the potential impacts of pollution from the development on the site and on neighbouring areas and also considers the potential for exposure to pollution levels above the Government's air quality objective concentration targets. The assessment should include separate consideration of the impacts of (i) the construction/demolition phase of development and (ii) the operational phase of development with appropriate mitigation measures highlighted for each phase;*
b. *requiring mitigation measures to be implemented to reduce emissions, particularly of nitrogen oxides and small particles, where assessments show that developments could cause a significant worsening of local air quality or contribute to the exceedances of the Government's air quality objectives;*
c. *requiring mitigation measures that reduce exposure to acceptable levels where developments are proposed that could result in the occupants being particularly affected by poor air quality;*
d. *requiring developments to be 'air quality neutral' and resist development proposals which would materially increase exceedances of local air pollutants and have an unacceptable impact on amenity or health unless the development mitigates this impact through physical measures and/or financial contributions to implement proposals in the Council's Local Air Quality Management Plan; and*
e. *requiring all decentralised energy schemes to demonstrate that they can be used without having an unacceptable impact on air quality. Where this is not possible, CHP systems will not be prioritised over other air quality neutral technologies."*

2.4.24 'Policy CC2 – Ensuring Sustainable Design and Construction' requires:

"...the implementation of sustainable design and construction measures in all major developments…"

and;

"The integration of sustainable design and construction measures will be encouraged in all other (i.e. non-major) developments, where feasible."

2.4.25 'Policy T1 – Transport' states that the Council will:

"...work with strategic partners to improve transportation provision, accessibility, and air quality in the borough, by improving and increasing the opportunities for cycling and walking, and by improving connections for bus services, underground, national and regional rail".

2.4.26 'Policy T7 – Construction and Demolition Logistics' states that:

"All construction, demolition, utilities and major logistic activities within the borough will be required to work with the council in developing the scope and impact of their operations. In order to mitigate the impact of any additional traffic or potential disruption to the network, careful planning and co-ordination with the council is required to ensure the smooth operation of the highway network."

2.4.27 'Policy CC13 – Control of Potentially Polluting Sources' states that:

"All proposed developments (including new buildings, demolition of existing buildings, conversions and changes of use) will be required to show that there will be no undue detriment to the general amenities enjoyed by existing surrounding occupiers of their properties, particularly where commercial and service activities will be close to residential properties. In the case of mixed use developments, similar protection will also be afforded to the prospective residents and other users where there is potential for activities within the new development to impact on their immediate neighbours on the same site. The council will, where appropriate, require mitigation measures if a nuisance, for example, from smoke, fumes, gases, dust, steam, light, vibration, smell, noise, spillage of gravel and building aggregates or other polluting emissions, would otherwise be likely to occur, to ensure that it will not."

2.4.28 In addition, LB Hammersmith and Fulham has a Supplementary Planning Document (SPD) dealing with planning obligations (LB Hammersmith and Fulham, 2018b). Key principle 'NN6 – Construction and Demolition Works' states that:

"A Demolition Method Statement and/or Construction Management Statement (carried out by a qualified structural or civil engineer) will be required to be submitted alongside applications for basement development, substantial developments and where the site is close to other premises."

2.4.29 Additionally, key principle 'NN7 – Environmental Pollution' stipulates:

"Applications for developments or uses with the potential to emit pollution from lighting, dust, smell, steam, fumes, gases or smoke or other effluent should be submitted with details of the proposed installation and/or use and effective mitigation measures, in accordance with relevant guidance and criteria."

Specifically related to air quality, key principle 'AQ1 Assessment of Air Quality Impacts of new Development' requires:

"all developments which may be impacted by local sources of poor air quality or may adversely contribute to local air quality to provide an air quality assessment that considers the potential impacts of pollution from the development on the site and on neighbouring areas and also considers the potential for exposure to pollution levels above the Government's air quality objective concentration targets. The assessment should include separate consideration of the impacts of (i) the construction/demolition phase of development and (ii) the operational phase of development with appropriate mitigation measures highlighted for each phase."

London Borough of Richmond upon Thames

2.4.30 The LB Richmond Local Plan was adopted in 2018. One of the strategic objectives within this plan is to:

"Reduce or mitigate environmental impacts and pollution levels (such as air, noise, light, odour, fumes, water and soil) and encourage improvements in air quality, particularly along major roads and areas that already exceed acceptable air quality standards."

2.4.31 More specifically, Policy LP 10 concerns local environmental impacts, pollution and land contamination. In terms of air quality, Policy LP 10 states:

"The Council promotes good air quality design and new technologies. Developers should secure at least 'Emissions Neutral' development. To consider the impact of introducing new developments in areas already subject to poor air quality, the following will be required:

1. *an air quality impact assessment, including where necessary, modelled data;*
2. *mitigation measures to reduce the development's impact upon air quality, including the type of equipment installed, thermal insulation and ducting abatement technology;*
3. *measures to protect the occupiers of new developments from existing sources;*
4. *strict mitigation for developments to be used by sensitive receptors such as schools, hospitals and care homes in areas of existing poor air quality; this also applies to proposals close to developments used by sensitive receptors."*

2.4.32 In terms of construction and demolition Policy LP 10 states:

"The Council will seek to manage and limit environmental disturbances during construction and demolition as well as during excavations and construction of basements and subterranean developments. To deliver this the Council requires the submission of Construction Management Statements (CMS) for the following types of developments:

1. *all major developments;*
2. *any basement and subterranean developments;*
3. *developments of sites in confined locations or near sensitive receptors; or*
4. *if substantial demolition/excavation works are proposed."*

2.4.33 LB Richmond is currently developing a new Local Plan and is in stages of early development.

2.5 Assessment Criteria

2.5.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).

2.5.2 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2021b). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

2.5.3 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
Fine Particles (PM_{10})	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [a]
Fine Particles ($PM_{2.5}$) [b]	Annual Mean	25 µg/m^3

[a] A proxy value of 32 µg/m3 as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM10 objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM10 objective are possible (Defra, 2021b).

[b] The PM2.5 objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

World Health Organisation Guideline for Annual Mean $PM_{2.5}$

2.5.4 The WHO has set a guideline for annual mean $PM_{2.5}$ of 10 µg/m^3. The guideline is not currently in UK regulations and there is no explicit requirement to assess against it. However, achievement of the guideline is a long-term aspiration of the UK Government (Defra, 2019b) and, as set out in Paragraph 2.4.19, the GLA aims to achieve it by 2030. As such, consideration has been included within this assessment.

Construction Dust Criteria

2.5.5 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)[1] (2016) has been used (the GLA's SPG (GLA, 2014b) recommends that the assessment be based on the latest version of the IAQM guidance). Full details of this approach are provided in Appendix B.

Screening Criteria for Construction Traffic Assessment

2.5.6 Environmental Protection UK (EPUK) and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix C, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.

2.5.7 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A3) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day. Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

1 The IAQM is the professional body for air quality practitioners in the UK.

Descriptors for Air Quality Impacts and Assessment of Significance

Construction Dust Significance

2.5.8 Guidance from IAQM (2016) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. This is the latest version of the guidance upon which the assessment methodology set out in the GLA guidance (GLA, 2014b) is based (the GLA guidance advises that the latest version of the IAQM guidance should always be used). The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Construction Traffic Impact Significance

2.5.9 There is no official guidance in the UK in relation to development control on how to describe air quality impacts, nor how to assess their significance. The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement; the experience of the consultants preparing the report is set out in Appendix D. Full details of the EPUK/IAQM approach are provided in Appendix C.

3 Assessment Approach

3.1 Baseline Conditions

3.1.1 Information on existing air quality considered as baseline conditions has been obtained by collating the results of monitoring carried out by the local authorities. Information of baseline air quality is necessary to determine the sensitivity of the area to air quality impacts. Air quality monitoring data is available for the years up to and including 2019. This information covers both the study area and nearby sites, the latter being used to provide context for the assessment. It is noted that Hammersmith Bridge has been closed to traffic since April 2019 and therefore use of results for 2018 represent a worst-case assessment with which to determine the sensitivity of the area to air quality impacts when compared to the current conditions. Background concentrations have been defined using the 2017-based national pollution maps published by Defra (2021a). These cover the whole of the UK on a 1x1 km grid.

3.2 Construction Impacts

3.2.1 The construction dust assessment considers the potential for impacts within 350 m of the site boundary; or within 50 m of carriageways used by construction vehicles. The assessment methodology follows the GLA's SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014b), which is based on that provided by IAQM (2016). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix B explains the approach in more detail.

3.3 Construction Traffic Impacts

3.3.1 The first step in considering the road traffic impacts of the project has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as detailed further in Paragraph 2.5.7 Appendix C. Where impacts can be screened out there is no need to progress to a more detailed assessment.

4 Site Description and Baseline Conditions

4.1.1 The proposed temporary ferry service is required as a diversion route for pedestrian and cycle traffic across the River Thames whilst the existing Grade II* listed Hammersmith Bridge is being repaired. The piers for the service will be located adjacent to the eastern side of Hammersmith Bridge. On the northern side of the river, the proposed Hammersmith Pier is to land on the slipway located at the end of Queen Caroline Street. On the southern side of the river, a steel structure will connect the pontoon to the landside tow path.

4.1.2 At the Hammersmith site, there are existing residential estates that surround the site along Queen Caroline Street.

4.1.3 At the Barnes site, existing residential properties lie south and south east of the site, along Castlenau and Riverview Gardens. To the west lies St Pauls School Playground, with the school building 200 m from the project site.

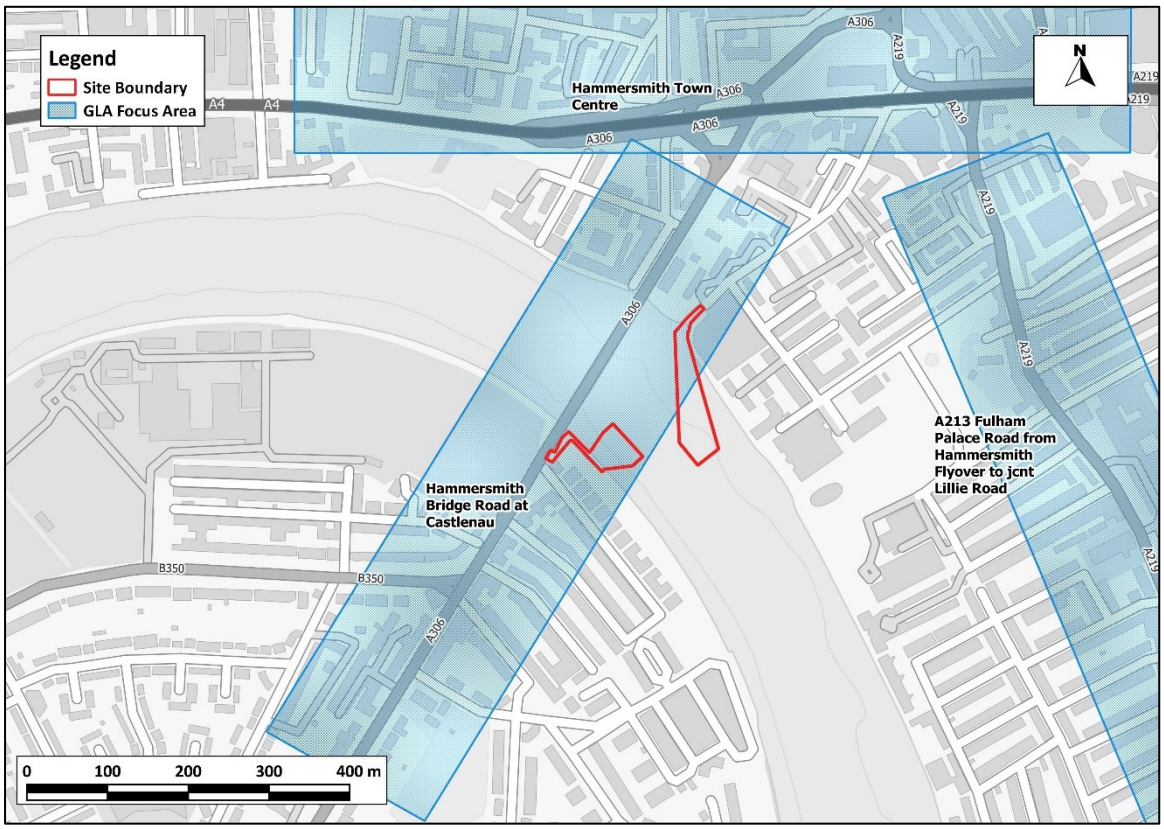
4.1 Air Quality Management Areas

4.1.4 The LB Hammersmith and Fulham and LB Richmond have investigated air quality within their areas as part of their responsibilities under the LAQM regime. Both Councils have declared whole borough AQMAs for exceedances of the annual mean nitrogen dioxide and 24-hour mean PM_{10} objectives.

4.2 Air Quality Focus Areas

4.2.1 Both the Hammersmith and Barnes sites are located within the 'Hammersmith Bridge Road at Castlenau' air quality Focus Area, shown in Figure 1. This is one of 187 air quality Focus Areas in London, these being locations that not only exceed the EU annual mean limit value for nitrogen dioxide but also locations with high levels of human exposure. Focus Areas were first defined in 2013 and last reviewed in 2016, prior to the closure of Hammersmith Bridge.

Figure 1: Focus Area Location



4.3 Local Air Quality Monitoring

4.3.1 LB Hammersmith & Fulham operates one automatic monitoring station within its area. This is not in close proximity to the project site; located approximately 2 km to the north. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International (using the 50% TEA in acetone method). These include seven within approximately 1 km of the Hammersmith site. Monitoring is also undertaken by the LB Richmond at four automatic monitors and a number of diffusion monitoring sites using tubes using the same method as LB Hammersmith and Fulham. One automatic monitor and one diffusion tube site are located within 1 km of the Barnes site. Results for the years 2013 to 2019 are summarised in Table 2 and the monitoring locations are shown in Figure 2. The most recently available data is for 2019, however Hammersmith Bridge was closed to traffic in 2019 and therefore measured concentrations near to the bridge were lower than in 2018. The use of 2018 data will provide a robust assessment in terms of determining the sensitivity of the area to air quality impacts and has therefore been used.

Table 2: Summary of Nitrogen Dioxide (NO_2) Monitoring (2013-2019) [a e]

Site No.	Site Type	Location	2013	2014	2015	2016	2017	2018 [b]	2019 [b]
Automatic Monitors - Annual Mean (µg/m³)									
HF4	Roadside	Shepherd's Bush	**76.2**	**80.3**	**76**	**78.9**	**77**	**71 (57.9)**	**60 (49.9)**
RI1	Roadside	Castlenau Library	39	37	34	36	31	31	27
Objective			**40**						
Automatic Monitors - No. of Hours > 200 µg/m³									
HF4	Roadside	Shepherd's Bush	11 **(203.1)**	0 (179.1)	**19**	**33**	**20**	8	4
RI1	Roadside	Castlenau Library	2	0	0	0	0	0	0
Objective			**18 (200) [c]**						
Diffusion Tubes - Annual Mean (µg/m³) [d]									
HF11	Roadside	Hammersmith Road	-	-	-	-	**78.6**	**74.8**	**69.1**
HF13	Roadside	Hammersmith Bridge Road	-	-	-	-	**64.1**	**48.4 (43.5)**	35.8 (34.1)
HF14	Roadside	Kings Street	-	-	-	-	**60.1**	**51.9 (45.7)**	**53.8 (46.6.)**
HF24(HF32)	Roadside	Queen Caroline Street	**90**	**78.8**	**77.5**	**79.9**	**72.9**	**62.2 (52.3)**	**55.6 (47.3)**
HF35(HF63)	Roadside	Talgarth Road	**65.2**	**56.1**	**49.8**	**59.8**	**50.9**	**47.4 (42)**	**44.2 (39.4)**
HF42	Roadside	Shortlands (a)	-	-	-	-	-	**50 (46.4)**	**44**
HF45	Roadside	Shortlands (d)	-	-	-	-	-	**47.5 (42.6)**	39.4
22	Kerbside	Castlenau (near Hammersmith Bridge)	**57**	**59**	**53**	**65**	**52**	**45**	32
Objective			**40**						

a Exceedances of the objectives are shown in bold.

b For 2018 and 2019 distance corrected to nearest relevant public exposure are provided in brackets.

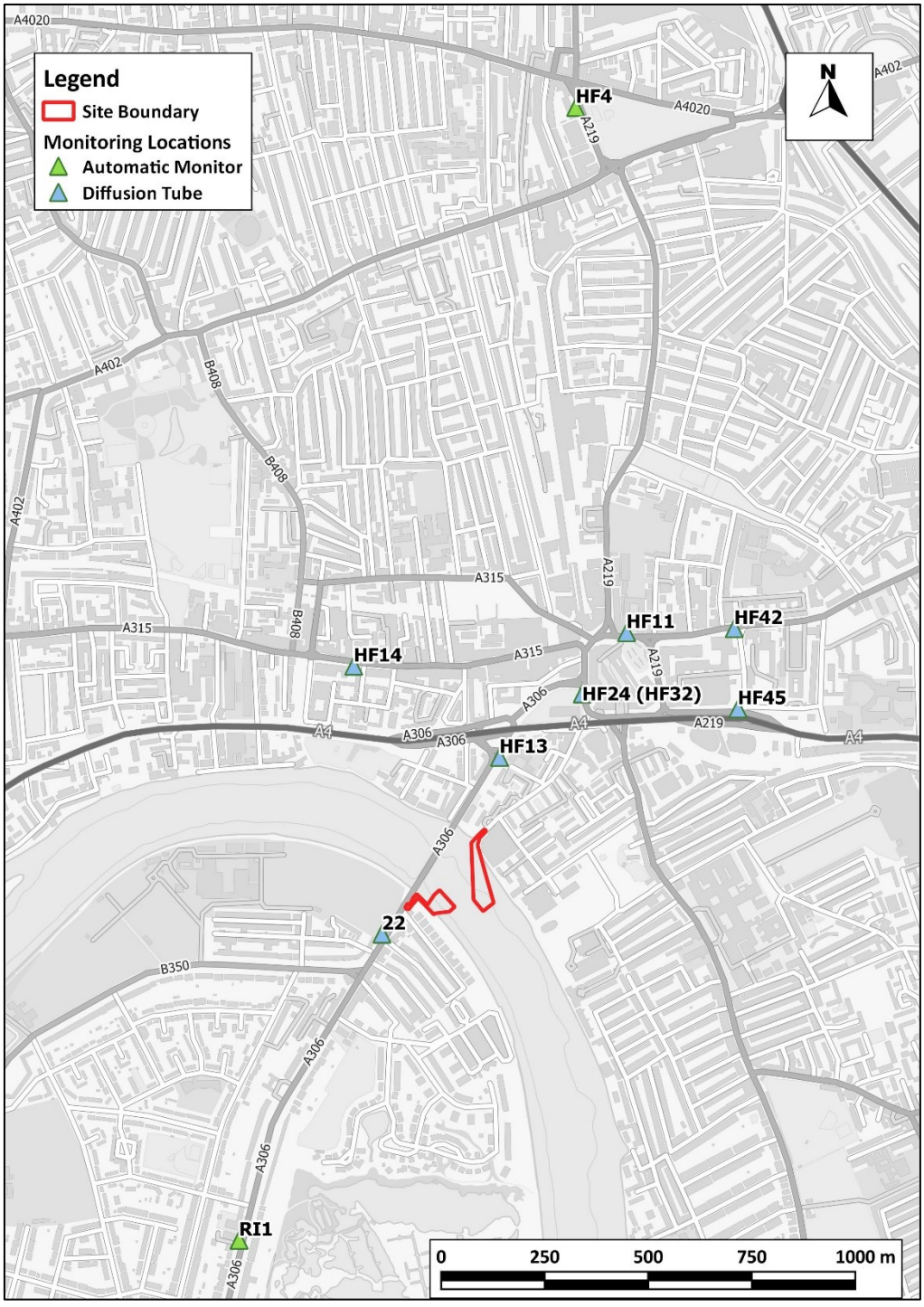
c Values in brackets are 99.79th percentiles, which are presented where data capture is <75%.

d A number of diffusion tubes were added to the network in 2017 and 2018.

e Data for automatic monitor 'RI1' and diffusion '22' taken from LB Richmond ASR (LB Richmond, 2020). Remaining data taken from LB Hammersmith and Fulham ASR (LB Hammersmith and Fulham, 2020).

4.3.2 The results show an exceedance of the annual mean nitrogen dioxide objective at all monitoring locations with the exception of automatic monitor 'RI1'. This is likely due to the monitoring sites close proximity to busy roads, such as Hammersmith Road and the Hammersmith Flyover. Measured concentrations at 'HF4' show a downward trend between 2013 and 2019. There is a general, but inconsistent, downward trend in the diffusion tube monitoring results over the past seven years.

Figure 2: Monitoring Locations



4.3.3 The Castlenau Library automatic monitoring station (RI1), located adjacent to Castlenau in LB Richmond approximately 1 km south west of the project, is the closest station that measures PM_{10} concentrations. LB Hammersmith and Fulham also run an automatic monitoring station that measures PM_{10}, located approximately 2 km north of the Hammersmith site. Results for the years 2013 to 2019 are summarised in Table 3. PM_{10} concentrations have been below the objectives for the last 6 years. There is no clear trend in monitoring results.

4.3.4 There are no monitors measuring $PM_{2.5}$ concentrations close to the sites.

Table 3: Summary of PM_{10} Automatic Monitoring (2013-2019) [a]

Site No.	Site Type	Location	2013	2014	2015	2016	2017	2018	2019
PM_{10} Annual Mean (µg/m^3)									
HF4	Roadside	Shepherd's Bush	36.4	26.5	25	27.4	38	26.4	25
RI1	Roadside	Castlenau Library	22	20	22	20	18	19	15
Objective			**40**						
PM_{10} No. Days >50 µg/m^3									
HF4	Roadside	Shepherd's Bush	33 (59.5)	0 (38.2)	10	17	14	4	11
RI1	Roadside	Castlenau Library	10	4	5	7	4	1	3
Objective			**35 (50) [b]**						

a Exceedances of the objectives are shown in bold.

b Means annualised where data capture is less than 75%, thus the 90.4th percentile of daily means is provided in parentheses.

4.4 Background Concentrations

4.4.1 Estimated background concentrations in the study area have been determined for 2018 and the opening year 2021 using Defra's 2018-based background maps (Defra, 2021a). The background concentrations are set out in Table 4. The background concentrations are all below the objectives.

Table 4: Estimated Annual Mean Background Pollutant Concentrations in 2018 and 2021 (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2018	36.8	20.6	13.4
2021	30.9	19.1	12.5
Objectives	**40**	**40**	**25/10 [a]**

a The PM2.5 objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. 10 µg/m3 is the WHO guideline for annual mean PM2.5; again, there is no requirement for local authorities to meet this.

5 Impact Assessment

5.1 Operational Ferry Emissions

5.1.1 Access to the ferries will be via new piers reached by extended walkways into the river. These walkways maximise the distance between the ferries and sensitive receptors, so that emissions from the ferries will be at some distance from existing, sensitive receptors, and only at the piers for short periods of time. Proposed operation information provided:

Vessel Type: FBM Hydrocat (Sky, Star and Storm)

Engine type: 2 x 317kW @ 2300 RPM, John Deere 6090SFM85 at EPA Tier 3 and EU Stage3a

Scheduling & Frequency:

- 06:00 – 22:00 on weekdays
- 08:00 – 22:00 at weekends
- Peak times (weekday only TBC)
  - 06:00 – 10:00 & 15:00 – 19:00
  - Frequency (from each pier): every 5-7 minutes
  - 2 vessels
  - 18 – 24 crossings per hour
- Off Peak times (weekday and weekend)
  - 10:00 – 15:00 & 19:00 – 22:00
  - Frequency (from each pier): every 10 -12 minutes
  - 1 vessel (2nd vessel layby at Barnes Pier)
  - 10 – 12 crossings per hour
- Transit time: 3 mins in each direction.
- Waiting time (min 2 mins):
  - Allow passing vessels to take priority
  - Allow loading/unloading of passengers

5.1.2 The piers will be > 40 m from any sensitive receptors, such as places of residence or members of the public on the river path along the Thames, where people could potentially spend sufficient time to represent relevant exposure to the objectives. On the Barnes side, the nearest property to a pier is 70 m and the river path is 40 m away. On the Hammersmith side, the river path is 65 m from the pier, and the closest residential property is 80 m from the pier.

5.1.3 Specific NOx emissions rates for the ferries are unavailable, however, based on the Tier III emissions limit it would be a maximum of 0.352 g/s. Previous work has been undertaken to understand how emissions from boats on the Thames affect air quality. The Air Quality Strategy for Port of London Authority (2017), looked at tugboat emissions using dispersion modelling to understand annual mean NOx and nitrogen dioxide contributions to local air quality. The report highlights that concentrations of river emissions drop sharply with distance from source due to dispersion of air pollutants. For example, at 40 m this represents a process contribution of approximately 0.2 µg/m^3 NOx (see Figure 2 in PLA Air Quality Strategy).

5.1.4 Similarly, a news article published by Thames Tideway (2019), which reports results from a study undertaken by AQC for the 'Felix' tug with 2 x 441 KW @ 1800rpm – Volvo Penta D16 engines (Livetts, 2021), shows an average process contribution of 0.13 µg/m^3 concentrations of nitrogen dioxide close to source, and at 50 m this dropped to 0.01 µg/m^3.

5.1.5 To assess the potential impact of ferry emissions on nearby receptors, these contributions are compared to the impact descriptors in Table C7 in Appendix C. Using the long term nitrogen dioxide average in assessment year 2018 of 31 µg/m^3 from roadside monitor RI1 (Table 2) as the baseline for the receptors nearest to the piers, this shows any process contribution under 2% or 0.8 µg/m^3 will have a negligible impact. As discussed in paragraphs 5.1.3 and 5.1.4, at the distance the ferries will be operating from any sensitive receptors process contributions will be much less than 0.8 µg/m^3, and as such, there will not be a significant impacts on local air quality.

5.1.6 Potentially lower emission ferries were explored for the ferry service, however, are not currently available for this use on the Thames. However, other measures will be implemented to minimise emissions, this includes installing shore power so there is no requirement for additional generators, LED lighting, and the use of the tide during operation.

5.1.7 Thus, due to the dispersion of pollutants with distance from the source, the impacts on air quality at these receptors will be negligible and are not considered further.

5.2 Construction Dust

5.2.1 The construction of the piers for the ferry service has been designed to minimise cumulative effects with the adjoining Hammersmith Bridge works and impacts on the local community, however, there would remain the potential to generate some dust emissions which may impact nearby residential properties. Generally, construction may give rise to a risk of dust impacts during earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. In this instance, dust generating activities would be minor, on the Hammersmith Site, where an electrical box and water supply would need to be installed. On the Barnes side, dust generating activities would include excavation and levelling for surfaces and the construction of a concrete bankseat.

5.2.2 The potential impacts of these works on neighbouring properties are considered below, with the level of risk identified, used to inform that selection of appropriate mitigation measures. Further details of proposed mitigation are set out in the Construction Environmental Management Plan (CEMP) and Appendix E.

5.2.3 Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are sensitive receptors within the distances set out in the guidance (see Appendix B), which may be exposed to dust and PM_{10} for 8-hours or more per day (i.e., residential locations). The closest sensitive receptors are described in section 5.4 and shown in Figure 3 and Figure 4. Thus, a detailed assessment is required. The following section sets out Step 2 of the assessment procedure. The piers would be manufactured off site and brought to site by river transport, the on-site construction works are limited to installation of walkways, gangways and berthing pontoons anchored to the riverbed using tubular piles. The works are expected to be minor and of short duration. The assessment will only consider locations on the riverbanks, as these are where potential sensitive receptors are located, and there is a negligible source of dust from the installation of the temporary piers within the river.

5.3 Potential Dust Emission Magnitude

Demolition

5.3.1 There are no demolition requirements at the onset of the works. There is, however, a need for removal at the cessation of ferry operation. This will involve the disconnection and modular removal of the pontoons and connecting structures and walkways, and pile removal. Additionally, any infrastructure installed, such as electrical wires and associated small boxes. The structures are all predominately modular and can be broken up and taken away. The piles will be removed via vibration. Other works will be classified as excavation. As such, demolition will not be considered further.

Earthworks

5.3.2 Only a very limited amount of earthworks will take place at the Hammersmith site, to enable the installation of any infrastructure such as electrical wiring and water access. Earthworks will be undertaken at the Barnes sites in preparation of pier construction and installation of the walkway. This will involve excavation and surface levelling, haulage, and landscaping, removing less than 5 tonnes of material over approximately 200 m^2. The south shore bankseat will then be constructed. Vehicles will move over a small section of unpaved surfaces on the Barnes side, and there will be two vehicles expected to access each site per day.

5.3.3 The characteristics of the soil at the development site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2020), as set out in Table 5. Overall, it is considered that, when dry, this soil has potential to be moderately dusty.

Table 5: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Mixed (Arenaceous [a] – Rudaceous [b])
European Soil Bureau Description	River Terrace – Sand/gravel
Soil Group	Light to medium
Soil Texture	Sand to Sandy Loam

a grain size 0.06 – 2.0 mm.

b grain size > 2.0 mm.

5.3.4 The earthworks will last over 2 weeks and dust will arise mainly from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table B1 in Appendix B, the dust emission class for earthworks is considered to be *small* for both sites.

Construction

5.3.5 Construction involves the installation of pre-fabricated walkways on both sides and berthing pontoons which are to be anchored to the riverbed using tubular piles. Construction is expected to take 46 days, with the predominate material being steel.

5.3.6 None of these activities are likely to generate significant quantities of dust. Based on the example definitions set out in Table B1 in Appendix B, the dust emission class for construction is considered to be *small*.

Trackout

5.3.7 During the construction period the maximum number of heavy vehicles leaving the site, which may track out dust and dirt, is estimated to be 2 per day, per site. Based on the example definitions set out in Table B1 in Appendix B, the dust emission class for trackout is considered to be *small*.

5.3.8 Table 6 summarises the dust emission magnitude for the project.

Table 6: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude	
	Hammersmith Site	Barnes Site
Demolition	N/A	N/A
Earthworks	Small	Small
Construction	Small	Small
Trackout	Small	Small

5.4 Sensitivity of the Area

5.4.1 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

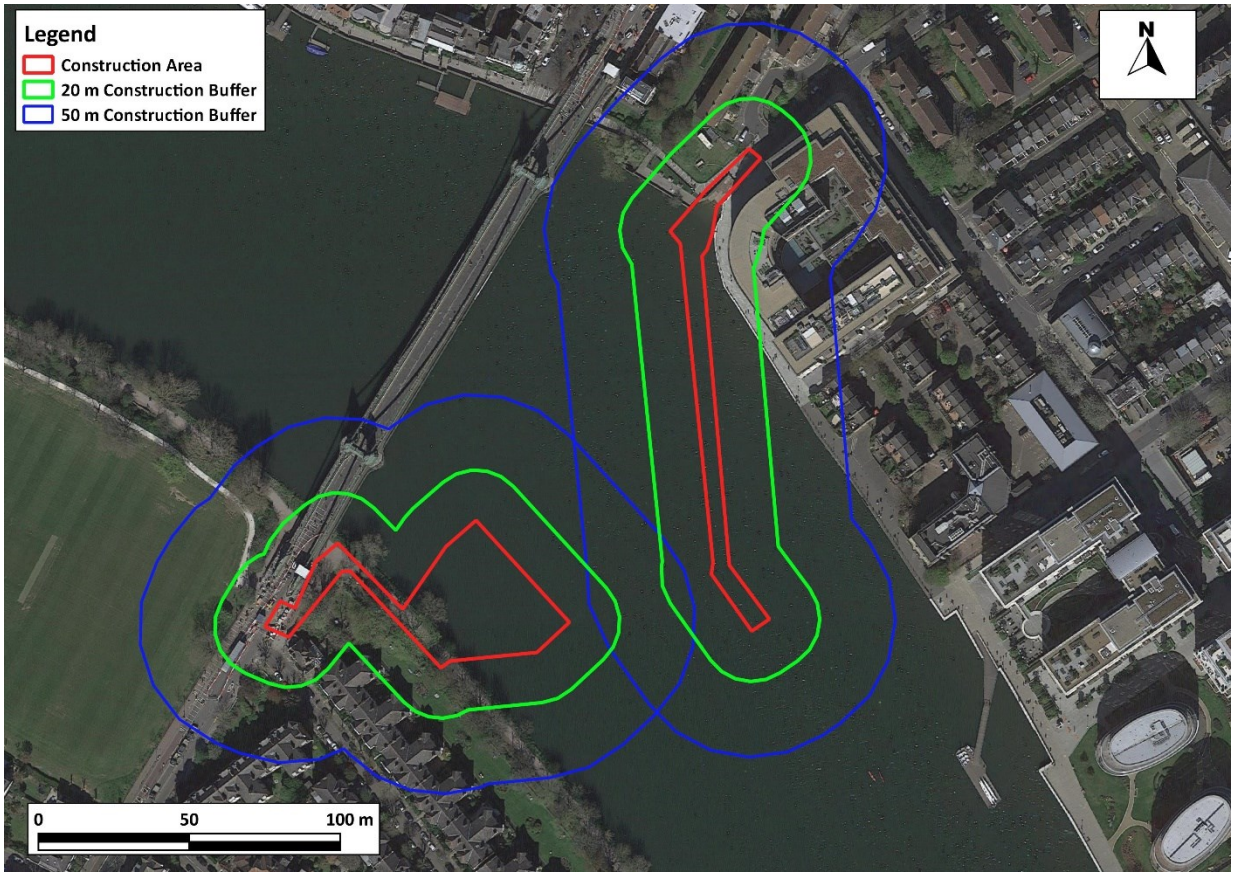
Sensitivity of the Area to Effects from Dust Soiling

5.4.2 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling, while parks and playing fields are of 'medium' sensitivity to dust soiling (Table B2 in Appendix B).

5.4.3 On the Hammersmith the site, there are approximately 40 residential properties within 20 m of the site and over 100 within 50 m (see Figure 3). This includes predominately residential apartments. To the south east are 'Riverside Studios', a large five to six-storey residential apartment block. To the north of the site there is one four-storey housing block within 50 m.

5.4.4 On the Barnes site, there is one residential property within 20 m, and approximately 20 within 50 m. This includes three-story residential apartments on Riverview Gardens, and five-storey residential apartments along Castlenau to the south and south-east of the site. To the west lies St Pauls School Playground. Using the matrix set out in Table B3 in Appendix B, the area surrounding the works on the Hammersmith site is of 'high' sensitivity to dust soiling, while 'medium' on the Barnes site.

Figure 3: 20 m and 50 m Distance Bands around Site Construction Area



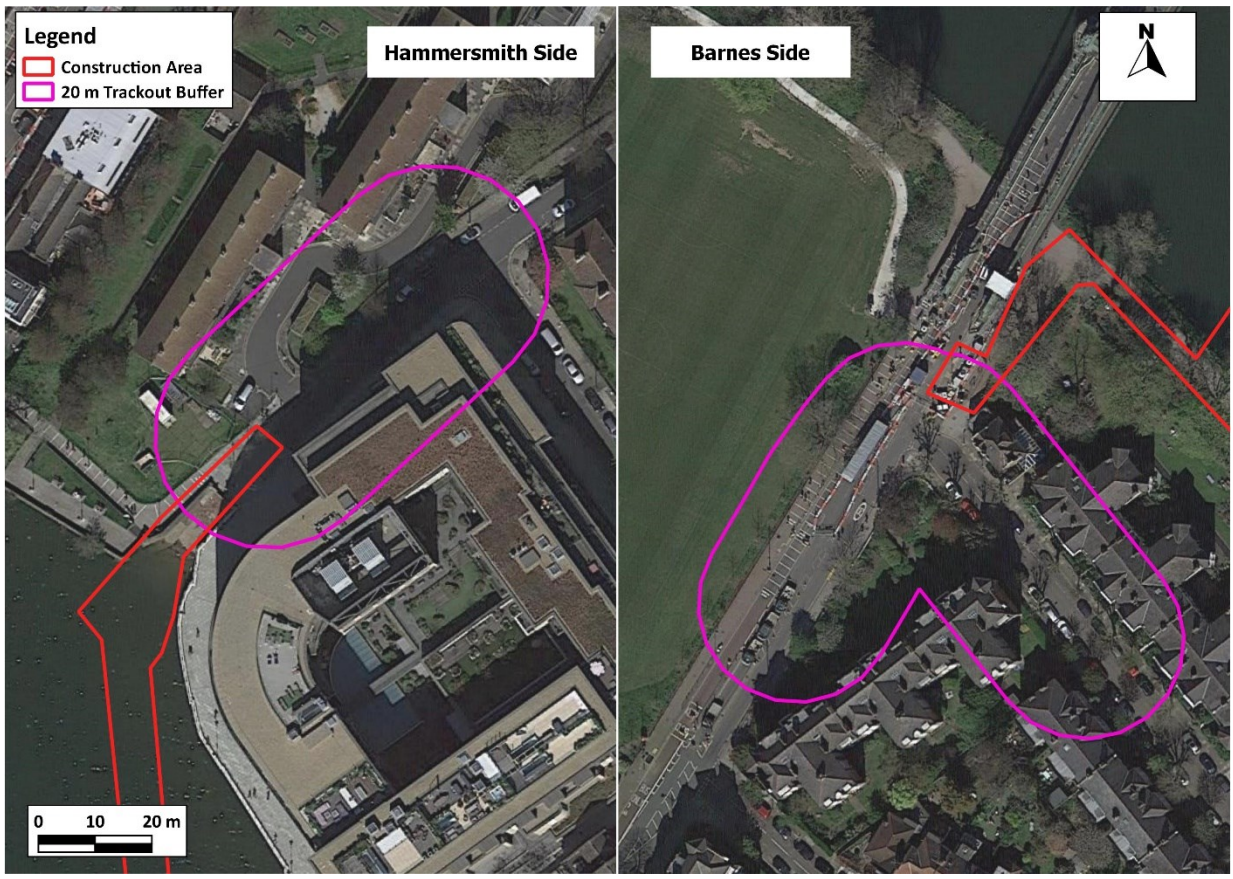
5.4.5 Table 6 shows that the dust emission magnitude for trackout is small and Table B3 in Appendix B thus explains that there is a risk of material being tracked 50 m from the site exit. It is expected access and egress from the Hammersmith site will be from Queen Caroline Street. On the Barnes site, vehicles would be expected to leave southbound on Castelnau, although vehicles may need to manoeuvre in a small section of Riverview Gardens on leaving the site. There are approximately 20 residential properties within 20 m of the carriageways along which material could be tracked on the Hammersmith site, and approximately 35 residential properties on the Barnes site (see Figure 4).

5.4.6

5.4.7 Table B3 in Appendix B thus indicates that both the Hammersmith site and the Barnes site is of 'high' sensitivity to dust soiling due to trackout.

Figure 4: 20 m Distance Band around Roads Used by Construction Traffic Within 50m of the Site Exits

Imagery ©2020 Google



Sensitivity of the Area to any Human Health Effects

5.4.8 Residential properties are also classified as being of 'high' sensitivity to human health effects, while parks and playing fields are classified as being 'low' sensitivity to human health effects. The matrix in Table B4 in Appendix B requires information on the baseline annual mean PM_{10} concentration in the area. The closest measured annual mean PM_{10} concentrations to the sites are those at the Castlenau Library automatic monitor 'RI1' (19 µg/m^3) shown in Table 3. The most recently available data for this site is 2018. The use of this data will provide a robust assessment (as traffic is likely to be reduced on this road due to the closure of Hammersmith Bridge in April 2019) in terms of determining the sensitivity of the area to air quality impacts, and has therefore been used. This location is sited along the same carriageway as Hammersmith Bridge and therefore is judged to be most representative of baseline concentrations. Using the matrix in Table B4 in Appendix B, the Hammersmith site is of 'low' sensitivity to human health effects for the area surrounding the onsite works, and the surrounding carriageways along which material can be tracked from the site is of 'low' sensitivity. For the Barnes site the area surrounding the onsite works is of 'low' sensitivity, and the surrounding carriageways along which material can be tracked is of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

5.4.9 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those carriageways along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

5.4.10 Table 7 summarises the sensitivity of the area around the proposed construction works.

Table 7: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area			
	Hammersmith Site		Barnes Site	
	On-site Works	Trackout	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity	Medium Sensitivity	High Sensitivity
Human Health	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity

5.5 Risk and Significance

5.5.1 The dust emission magnitudes in Table 6 have been combined with the sensitivities of the areas in Table 7 using the matrix in Table B6 in Appendix B, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 8. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 6.1 (step 3 of the assessment procedure).

Table 8: Summary of Risk of Impacts Without Mitigation

Source	Hammersmith Site		Barnes Site	
	Dust Soiling	Human Health	Dust Soiling	Human Health
Demolition	N/A	N/A	N/A	N/A
Earthworks	Low Risk	Negligible Risk	Low Risk	Negligible Risk
Construction	Low Risk	Negligible Risk	Low Risk	Negligible Risk
Trackout	Low Risk	Negligible Risk	Low Risk	Negligible Risk

5.5.2 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, as outlined in Appendix E and the Construction Environmental Management Plan (CEMP) for the project, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016).

5.6 Construction Traffic Emissions

5.6.1 The construction works will generate traffic associated with removal of material and, delivery of plant and materials, including steel. The trip generation during construction of the temporary ferry service is not known, but an estimation has been provided. This trip generation has been compared to the screening criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Appendix C). The daily number of vehicles is expected to be approximately one per day over the construction phase. Construction is anticipated to occur over a 3-month period. As such, it is anticipated the Annual Average Daily Traffic (AADT) on any local road during construction will be well below the screening threshold of 25 HDVs and 100 LDVs for inside an AQMA. As such, there is no requirement for a detailed assessment of road traffic impacts at existing receptors and it can be concluded that the project will not have a significant impact on local air quality.

5.7 Cumulative Impacts

5.7.1 The potential cumulative effects with the work being undertaken on the existing bridge alongside the construction of the piers, and then operation of the ferries has been considered.

Construction

5.7.2 The IAQM guidance is clear that, with appropriate mitigation measures in place, any residual construction dust effects from an individual site will be ‘not significant’. Work would also have to be taking place in areas of both sites that are close to a receptor in order for cumulative effects to occur.

5.7.3 CEMPs will be in place for both the construction of the piers and the Hammersmith Bridge works, with this mitigation in place it is anticipated that the cumulative effects of these schemes will be not significant.

Operation

5.7.1 During operation, any small potential increases in pollutant concentrations associated with ferry emissions or traffic associated with the ferry service, would be offset by the significant reduction traffic that would have been associated with the open Hammersmith Bridge. Operationally, cumulative schemes are not expected to affect local air quality due to the negligible impact expected from ferry operation.

6 Mitigation

6.1 Construction Dust Impacts

6.1.1 Measures to mitigate dust emissions will be adopted during the construction phase of the development in order to minimise effects upon nearby sensitive receptors, as set out in the CEMP.

6.1.2 The site has been identified as a Low Risk site during all phases of construction on both the Hammersmith and Barnes sites. The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014b) describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on what monitoring should be undertaken during the construction phase. This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix E and in the CEMP for the works

6.1.3 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

6.1.4 The IAQM guidance, on which the GLA's guidance is based, is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out in Appendix E and included in the CEMP for the works are based on the GLA guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

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

6.2 Construction Traffic Impacts

6.2.1 The assessment has demonstrated that the construction traffic will not cause any exceedances of the air quality objectives and that the overall effect of the project will be 'not significant'. It is, therefore, not considered appropriate to propose further mitigation measures for this development, however measures are included in the CEMP for the works.

6.2.2 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law)

7 Conclusions

7.1.1 All construction works have the potential to create dust, however works for the project are minor, with pre-fabricated modular infrastructure being delivered via barge. Activities with dust creating potentials will be mitigated using a package of mitigation measures set out in the CEMP to minimise dust emissions. With these measures in place, it is expected that any residual effects will be 'not significant'.

7.1.2 The impacts of increased traffic emissions arising from the additional traffic during construction on local carriageways, will have an insignificant effect on air quality at existing residential properties. The overall air quality effects of the temporary ferry service are additionally judged to be 'not significant', due to the distance between the ferries and any sensitive receptors.

7.1.3 The development will have no adverse effects on local air quality conditions; thus no additional mitigation have been proposed for the operational phase.

8 References

British Geological Survey. (2020). *UK Soil Observatory Map Viewer.* Retrieved from http://mapapps2.bgs.ac.uk/ukso/home.html

Defra. (2007). *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.* Defra.

Defra. (2019). *Clean Air Strategy 2019.* Retrieved from https://www.gov.uk/government/publications/clean-air-strategy-2019

Defra. (2021a). *Local Air Quality Management (LAQM) Support Website.* Retrieved from http://laqm.defra.gov.uk/

Defra. (2021b). *Review & Assessment: Technical Guidance LAQM.TG16 April 2021 Version.* Defra. Retrieved from https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf

GLA. (2014a). *Sustainable Design and Construction Supplementary Planning Guidance.* Retrieved from https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/sustainable-design-and

GLA. (2014b). *The Control of Dust and Emissions from Construction and Demolition SPG.* Retrieved from https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and

GLA. (2018a). *London Environment Strategy.*

GLA. (2018b). *Mayor's Transport Strategy.* Retrieved from https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf

GLA. (2019). *The London Plan Intend to Publish version.* Retrieved from https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/intend-publish-london-plan-2019

GLA. (2021). *The London Plan: The Spatial Development Strategy for London.* Retrieved from https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan

IAQM. (2016). *Guidance on the Assessment of Dust from Demolition and Construction v1.1.* Retrieved from http://iaqm.co.uk/guidance/

LB Hammersmith and Fulham. (2018a). *Hammersmith & Fulham - Local Plan.*

LB Hammersmith and Fulham. (2018b). *Planning Guidance - Supplementary Planning Document.*

LB Hammersmith and Fulham. (2020). *Air Quality Annual Status Report for 2019.*

LB Richmond. (2020). *Air quality Annual Status Report for 2019.*

Livetts. (2021). *About Felix.* Retrieved from https://www.livetts.co.uk/fleet/felix/

Ministry of Housing, Communities & Local Government. (2019a). *National Planning Policy Framework.* Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

Ministry of Housing, Communities & Local Government. (2019b). *Planning Practice Guidance.* Retrieved from https://www.gov.uk/government/collections/planning-practice-guidance

Moorcroft and Barrowcliffe et al. (2017). *Land-Use Planning & Development Control: Planning For Air Quality v1.2.* IAQM, London. Retrieved from http://iaqm.co.uk/guidance/

Port of London Authority. (2017). *Draft Air Quality Strategy for the Tidal Thames.* Retrieved from https://www.pla.co.uk/assets/airqualitymaindoc051217.pdf

Thames Tideway. (2019). *Using river much better for air quality, study finds.* Retrieved from https://www.tideway.london/news/site-news/2019/november/using-river-much-better-for-air-quality-study-finds/

The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043. (2002). HMSO. Retrieved from https://www.legislation.gov.uk/uksi/2002/3043/contents/made

The Air Quality (England) Regulations 2000 Statutory Instrument 928. (2000). HMSO. Retrieved from http://www.legislation.gov.uk/uksi/2000/928/contents/made

The European Parliament and the Council of the European Union. (1997). *Directive 97/68/EC of the European Parliament and of the Council.* Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:31997L0068

Appendix A:
London-Specific Policies and Measures

London Plan

Development Plans

Policy SI1 of the London Plan (GLA, 2021) states the following regarding strategic development plans:

Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

London Environment Strategy

The air quality chapter of the London Environment Strategy sets out three main objectives, each of which is supported by sub-policies and proposals. The Objectives and their sub-policies are set out below:

"Objective 4.1: Support and empower London and its communities, particularly the most disadvantaged and those in priority locations, to reduce their exposure to poor air quality.

- *Policy 4.1.1 Make sure that London and its communities, particularly the most disadvantaged and those in priority locations, are empowered to reduce their exposure to poor air quality*
- *Policy 4.1.2 Improve the understanding of air quality health impacts to better target policies and action*

Objective 4.2: Achieve legal compliance with UK and EU limits as soon as possible, including by mobilising action from London Boroughs, government and other partners

- *Policy 4.2.1 Reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport*
- *Policy 4.2.2 Reduce emissions from non-road transport sources, including by phasing out fossil fuels*
- *Policy 4.2.3 Reduce emissions from non-transport sources, including by phasing out fossil fuels*
- *Policy 4.2.4 The Mayor will work with the government, the London boroughs and other partners to accelerate the achievement of legal limits in Greater London and improve air quality*
- *Policy 4.2.5 The Mayor will work with other cities (here and internationally), global city and industry networks to share best practice, lead action and support evidence based steps to improve air quality*

Objective 4.3: Establish and achieve new, tighter air quality targets for a cleaner London by transitioning to a zero emission London by 2050, meeting world health organization health-based guidelines for air quality

- *Policy 4.3.1 The Mayor will establish new targets for PM2.5 and other pollutants where needed. The Mayor will seek to meet these targets as soon as possible, working with government and other partners*
- *Policy 4.3.2 The Mayor will encourage the take up of ultra low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines*
- *Policy 4.3.3 Phase out the use of fossil fuels to heat, cool and maintain London's buildings, homes and urban spaces, and reduce the impact of building emissions on air quality*
- *Policy 4.3.4 Work to reduce exposure to indoor air pollutants in the home, schools, workplace and other enclosed spaces"*

While the policies targeting transport sources are significant, there are less obvious ones that will also require significant change. In particular, the aim to phase out fossil-fuels from building heating and cooling and from NRMM will demand a dramatic transition.

Low Emission Zone (LEZ)

The LEZ was implemented as a key measure to improve air quality in Greater London. It entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects diesel-engined lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived from lorries and vans. Since 1 March 2021, a standard of Euro VI has applied for HGVs, buses and coaches, while a standard of Euro 3 has applied for large vans, minibuses and other specialist diesel vehicles since 2012.

Ultra Low Emission Zone (ULEZ)

London's ULEZ was introduced on 8 April 2019. The ULEZ currently operates 24 hours a day, 7 days a week in the same area as the current Congestion Charging zone. All cars, motorcycles, vans, minibuses and Heavy Goods Vehicles will need to meet exhaust emission standards (ULEZ standards) or pay an additional daily charge to travel within the zone. The ULEZ standards are Euro 3 for motorcycles; Euro 4 for petrol cars, vans and minibuses; Euro 6 for diesel cars, vans and minibuses; and Euro VI for HGVs, buses and coaches.

From 25 October 2021, the ULEZ will cover the entire area within the North and South Circular roads, applying the emissions standards for light vehicles. The ULEZ will not include any requirements relating to heavy vehicle emissions beyond 1 March 2021, as these will be addressed by the amendments to the LEZ.

Other Measures

Since 2018 all taxis presented for licencing for the first time must be zero emission capable (ZEC). This means they must be able to travel a certain distance in a mode which produces no air pollutants. From 2018 all private hire vehicles (PHVs) presented for licensing for the first time must meet Euro 6 emissions standards. Since January 2020, all newly manufactured PHVs presented for licensing for the first time must be ZEC (with a minimum zero emission range of 10 miles). The Mayor's aim is that the entire taxi and PHV fleet will be made up of ZEC vehicles by 2033.

The Mayor has also proposed to make sure that TfL leads by example by cleaning up its bus fleet, implementing the following measures:

- TfL will procure only hybrid or zero emission double-decker buses from 2018;
- a commitment to providing 3,100 double decker hybrid buses by 2019 and 300 zero emission single-deck buses in central London by 2020;
- introducing 12 Low Emission Bus Zones by 2020;
- investing £50m in Bus Priority Schemes across London to reduce engine idling; and

- retrofitting older buses to reduce emissions (selective catalytic reduction (SCR) technology has already been fitted to 1,800 buses, cutting their NOx emissions by around 88%).

Appendix B: Construction Dust Assessment Procedure

The criteria developed by IAQM (2016), upon which the GLA's guidance is based, divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table B1.

Table B1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level

Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes
Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

a These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

The sensitivity of the area is defined taking account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters to reduce the risk of wind-blown dust.

The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table B2. These receptor sensitivities are then used in the matrices set out in Table B3, Table B4 and B5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table B6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix E.

STEP 4: Determine Significant Effects

The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table B2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially-sensitive horticultural), footway, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footway, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or	Sites of Special Scientific Interest with dust sensitive features

	locations with a national designation where the features may be affected by dust deposition	
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table B3: Sensitivity of the Area to Dust Soiling Effects on People and Property [2]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

Table B4: Sensitivity of the Area to Human Health Effects [2]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	**>32 µg/m^3**	**>100**	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	**>100**	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	**>100**	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low

2 For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a large dust emission magnitude for trackout, 200 m from sites with a medium dust emission magnitude and 50 m from sites with a small dust emission magnitude, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table B5: Sensitivity of the Area to Ecological Effects [2]

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

Table B6: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk

Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Appendix C EPUK & IAQM Planning for Air Quality Guidance

The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;

- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
    - Spark ignition engine: 250 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Impacts of the Development on the Local Area

The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

"The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards

are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix D.

Impact Description

The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table C7 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table C7: Examples Impact Descriptors for Individual Receptors for All Pollutants [a]

Long-Term Average Concentration At Receptor In Assessment Year [b]	Change in concentration relative to AQAL [c]				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

a Values are rounded to the nearest whole number.

b This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, WHO guideline or an Environment Agency 'Environmental Assessment Level (EAL)'.

Appendix D: Professional Experience

Penny Wilson, BSc (Hons) CSci MIEnvSc MIAQM

Ms Wilson is an Associate Director with AQC, with more than 19 years' relevant experience in the field of air quality. She has carried out numerous assessments for a range of infrastructure developments including power stations, road schemes, ports, airports and residential/commercial developments. The assessments have covered operational and construction impacts, including odours. She also provides services to local authorities in support of their LAQM duties, including the preparation of Review and Assessment and Action Plan reports, as well as audits of Air Quality Assessments submitted with planning applications. She has provided expert evidence to a number of Public Inquiries, and is a Member of the Institute of Air Quality Management and a Chartered Scientist.

Lauren Armstrong, BSc (Hons) MSc

Mrs Armstrong is an Assistant Consultant with AQC, having joined the company in February 2020. Prior to joining AQC she completed an MSc degree in Climate Change: Environment, Science and Policy at King's College London where her studies explored the physical and social aspects of a changing climate and environment, research methods and environmental monitoring. She is now gaining experience in the field of air quality monitoring and assessment.

Appendix E: Construction Mitigation

The following is a set of best-practice measures from the GLA guidance (GLA, 2014b) that should be incorporated into the specification for the works. These measures are included in the CEMP. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list has been refined and expanded upon when producing the CEMP.

Site Management

- Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary;
- display the head or regional office contact information;
- record and respond to all dust and air quality pollutant emissions complaints;
- make a complaints log available to the local authority when asked;
- carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the Local Authority when asked;
- increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions are being carried out and during prolonged dry or windy conditions;
- record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and ensure that the action taken to resolve the situation is recorded in the log book; and
- deliveries made by barge where appropriate.

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- avoid site runoff of water or mud;
- keep site fencing and barriers clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of the London LEZ (and ULEZ);
- ensure all Non-road Mobile Machinery (NRMM) comply with the standards set within the GLA's Control of Dust and Emissions During Construction and Demolition SPG. This outlines that, from 1 September 2020 NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum, while NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IV of the Directive as a minimum;
- ensure all vehicles switch off engines when stationary – no idling vehicles;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery-powered equipment where practicable; and
- implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using recycled water where possible and appropriate;
- use enclosed chutes, conveyors and covered skips; and
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

Waste Management

- Reuse and recycle waste to reduce dust from waste materials; and
- avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

- Topsoil to be stripped and then stockpiled adjacent to the carriageway for limited period prior to collection.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces), if possible; and
- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Measures Specific to Trackout

- Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site;
- avoid dry sweeping of large areas; and
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.