Land at Frog Island, Ferry Lane, Rainham

784-B065006

Air Quality, Dust, Odour & Fumes, Noise and Vibration, Greenhouse Gases and Glare

On behalf of the Appellant, S Walsh & Sons

Appeal against Enforcement Notice issued by the London Borough of Havering

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S Walsh & Sons

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1.0 INTRODUCTION

1.1 QUALIFICATIONS AND EXPERIENCE

1.1.1 My name is Nigel Mann. I am employed as a Director – Environmental Scientist at the Leicester office of Tetra Tech Limited.

1.1.2 I am a Member of the Institute of Environmental Management and I hold the degree of Master of Science in Environmental Science.

1.1.3 I have 25 years' experience in air quality assessment, management and enforcement. I have been employed by Tetra Tech (Tt), formerly WYG Planning Environment and Transport Ltd (WYG), since January 2001, where I currently manage the acoustics, air quality, lighting and odour teams nationally for Tetra Tech.

1.1.4 I have been involved with air quality and noise assessments at the appeal site since 2014 and have been responsible for undertaking the modelling and reviewing of both noise and air quality assessments. I am therefore familiar with the appeal site and the surrounding area and have made myself aware of the relevant policy background and issues relating to this appeal. I have overseen all technical reports produced from the initial instruction to present.

1.1.5 I have worked on multiple mineral planning applications of a similar scale to the S Walsh and Son (Walsh) operation at Ferry Lane, Rainham.

1.1.6 I have produced this proof of evidence on behalf of S. Walsh and Sons Ltd to provide supporting technical evidence on matters regarding air quality, dust, odour and noise associated with this Enforcement Appeal, and to prepare independent evidence on these matters to assist the Inquiry.

1.2 DOCUMENTS REFERENCED

1.2.1 I refer in this Proof of Evidence to documents that are listed in the Core Documents list, using the abbreviation CD. Appendices are provided where I rely on documents not in the Core Documents list. The following documents are referenced:

- Tetra Tech Transport Assessment, including proposed site access drawing (ref: B065006 Dated 12 Apr 2024);
- CD14.1 - The National Planning Policy Framework (NPPF) – December 2023;
- PG to LBoH Scoping email (within appendix B of Transport Assessment (ref: B065006 Dated 12 Apr 2024)
- Greater London Authority - Air Quality Neutral: February 2023.

2.0 BACKGROUND AND SCOPE OF MY EVIDENCE

2.1 ENFORCEMENT NOTICE

2.1.1 London Borough of Havering (LBoH) served an enforcement notice on 18th July 2022 for the alleged breach of planning control at S Walsh & Son Limited, Ferry Lane, Rainham, RM13 9YH. The alleged breach of planning control refers to:

(1) Without the benefit of planning permission, the material change of use of the Land from use for storage to a waste management facility importing, processing, and exporting waste materials; and,

(2) Without the benefit of planning permission, operational development through the siting of stacked shipping containers on the Land.

2.1.2 In terms of air quality and dust, reasons 3, 4 and 5 of the enforcement notice state the following:

"3. The use of the land for open air waste storage and processing results in dust pollution which adversely affects amenity of those working in and adjacent to the area. In accordance with the relevant planning policies below, activities likely to generate dust should be fully enclosed. In this respect, the unauthorised use of the Land is contrary to the London Plan March 2021 (the London Plan) Policies SI1 and SI8, the Havering Local Plan November 2021 (the Local Plan) Policy 34 and the Joint Waste Development Plan Document for the East London Waste Authority Boroughs November 2011 (the JWDPD) Policy W5.

4. The use of the Land for waste storage and processing of building material, including the stockpiling of material, stacking of shipping containers, complete lack of landscape/urban greening, dust effects and mud on surrounding roads results in a visually obtrusive development which detract from the visual amenity of the area and views of the Land. In this respect, the unauthorised use of the Land is contrary to the London Plan Policies SI8 and G5, the Local Plan Policies 19, 26 and 27 and the JWDPD Policy W5.

5. Without a detailed transport assessment, which would be required to accompany any planning application, and due to the lack of control over throughput and vehicle movements, the use for waste storage and processing of building material would result in unacceptable impacts on the highway network. The lack of adequate wheel washing facilities results in dangerous highway conditions through mud being deposited on roads. In these respects, the unauthorised use of the Land is contrary to the London Plan Policies T4, SI15 and SI16, the Local Plan Policies 23 and 31 and JWDPD Policy W5."

2.1.3 An appeal was made on 6 grounds as set out in s174(2) of the Town and Country Planning Act 1990 (TCPA), namely:

(a) that, in respect of the alleged breach of planning control, planning permission, should it be required, ought to be granted;

(b) that those matters (if they occurred) do not constitute a breach of planning control;

(c) that, at the date when the notice was issued, no enforcement action could be taken in respect of any breach of planning control which may be constituted by those matters;

(d) that copies of the enforcement notice were not served as required by section 172;

(e) the steps required to comply with the requirements of the notice are excessive; and,

(f) the period specified in the notice in accordance with section 173(9) falls short of what should reasonably be allowed.

2.2 SCOPE

2.2.1 I have produced this proof of evidence on behalf of S Walsh & Son Limited in support of the appeal against the enforcement notice served on 18th July 2022 for the alleged breach of planning control. The evidence includes review and reference to previous air quality and dust monitoring and assessments undertaken for the site together with recent on-site observations and monitoring. It will demonstrate that robust assessments of the potential impact of site operations have been completed and that any air quality, dust, noise, vibration, odour, fumes, greenhouse gases, mud on the road and glare being produced by activities on-site are being undertaken in accordance with relevant planning policies.

2.2.2 My evidence focuses on the key points raised in Reasons 3, 4 and 5. These being:

(1) The use of the land for open air waste storage and processing results in dust pollution which adversely affects the amenity of those working in and adjacent to the area;

(2) The use of the Land for waste storage and processing of building materials, including the stockpiling of materials, results in dust effects and mud on surrounding roads;

(3) The lack of adequate wheel washing facilities results in dangerous highway conditions through mud being deposited on roads; and,

(4) Contrary to the London Plan Policies , the London Borough of Havering (LBoH) Local Plan and JWDPD Policy W5.

2.2.3 This evidence refers to the following technical reports produced by Tetra Tech Limited and PDE Consulting Limited, copies of which are provided in the appendices of this proof:

- 784-B034776 Frog Island AQ 20Sept22 – Dated 20th September 2022 – Air Quality Assessment undertaken to assess the road traffic emission impacts in support of a of a planning application to regularise the existing operation on the site of Frog Island, Ferry Lane South, Rainham.
- 784-B034776 Frog Island Particulate Matter AQ 20Sep22 – Dated 20th September 2022 – Detailed particulate matter impact assessment to determine whether the impacts of PM_{10} & $PM_{2.5}$ emissions from the operations/activities at Frog Island, Ferry Lane South, Rainham meet the required air quality standards (AQS) for the protection of human health.
- Dust Management Plan_v3 – Produced by PDE Consulting Limited, dated May 2018 – Dust Management Plan (DMP) prepared by PDE Consulting Limited on behalf of S Walsh and Son Limited for their permitted waste facility at Frog Island.

3.0 BACKGROUND TO THE APPEAL

3.1 THE APPEAL SITE

3.1.1 **Figure 1** shows the site boundary as well as the location of the site access. The highway network near the site is the responsibility of London Borough of Havering (LBoH) as the Local Highway Authority (LHA) with the exception of the A13 which is the responsibility of the National Highways.

Figure 1 – Site Location

3.1.2 The Site comprises circa 2.8 ha of land at Frog Island, Ferry Lane in the south of the Borough in Rainham within the London Borough of Havering.

3.1.3 The Site is bounded by Ferry Lane to the east with existing industrial uses beyond. On the western side of Ferry Lane, a 9-metre-wide planted verge separates the edge of the highway from the boundary of the Site. The flood defences for the River Thames, comprising a reinforced concrete flood wall, forms the western boundary of the Site. The northern boundary is defined by existing palisade fencing which demarks the Site from the adjoining Renewi Waste Management Facility. Further industrial uses are located to the north and north-east of the Site.

3.1.4 Vehicular access to the site is provided by an existing simple priority junction on Ferry Lane.

3.1.5 Ferry Lane bounds the site to the east and is aligned in an approximate north-south direction. Ferry Lane connects with Coldharbour Lane to the south and Ferry Lane/Coldharbour Lane

roundabout to the north. Following the road from the northern arm at the roundabout, this route connects to Ferry Lane dumbbell roundabouts and provides access to the A13 via slip roads. Ferry Lane is subject to a 30 mph speed limit.

3.2 SITE ACTIVITIES

3.2.1 The onsite activities comprise a mixed-use development. The western part of the Site comprising circa 2.8 ha relates to the parking and storage of haulage vehicles operated by the appellant together with the storage of building material, e.g. paving slabs, for onwards transport from the Site. The reminder of the Site is currently used in connection with the recycling and processing of imported inert construction, demolition, and excavation waste originating principally from the East London Joint Waste Planning Area.

3.2.2 The materials processing operations are undertaken in the open and comprise the screening, crushing, and washing of imported material to produce aggregate building products of various grades and reprocessed soils for use in local building and road construction projects. Storage areas and stocking bays for processed and imported materials together with metals are also located within the materials processing area.

3.2.3 Other ancillary uses on the Site associated with the storage use and the materials processing use comprise a lorry wheel washing facility, car parking area for 48 cars, temporary site offices and meeting room (portacabins), employee welfare/toilet facilities, weighbridge with associated office and a covered workshop area for the maintenance of onsite plant, vehicles, and equipment. A water bowser is also permanently stored on site to assist with dust suppression from stockpiles during periods of dry windy weather conditions.

3.2.4 The eastern and south-eastern boundary of the materials processing uses are screened by the presence of metal shipping containers stacked 2 or 3 units high. A total of 35 metal shipping containers are located on the site boundary. Whilst the lower containers are filled with soils to ensure stability, the containers are also used for storge of materials that need to be kept dry, i.e. cement. Some containers are used to store water which is used for dust suppression around the site in connection with the processing activities.

3.2.5 In March 2016, the appellant applied for an environmental permit which was subsequently granted on 11 July 2016. The appellant began waste processing activities shortly afterwards in July 2016. The activities on the Site are regularly inspected by the Environment Agency officers and monitored against the conditions of the environmental permit. No formal complaints have been raised by the Agency to the on-site activities.

3.2.6 The hours of operation for the site are currently:

Weekdays – 05:00hrs to 20:00hrs.

Weekends – 06:00hrs to 17:00hrs.

Some nights depending on certain works on highways and ship discharging.

3.3 RECENT SITE OBSERVATIONS AND MONITORING

3.3.1 A site visit was undertaken on 14/03/24 and the following observations and measurements were made.

Dust Monitoring

3.3.2 A calibrated OSIRIS (MCERTS Qualifying Light Scatter particle monitor) was used to measure short-term (1-hr average) particulate levels at the locations shown in **Figure 2** during simulated worst-case operations (all crushing, grading and screening machinery operating continuously and simultaneously). The wind was approximately 4-5 m/s from the south west.

Figure 2 - 14 March 2024 Worst-Case Simulation Dust/Particle Monitoring Locations

Table 1 – 14th March 2024 Worst-Case Simulation Dust/ Particle Monitoring Results

Location	1 (off site – down wind) 1-hr Average Dust / Particles PM_{10} µg/m³	2 (off site up wind – background) 1-hr Average Dust / Particles $PM_{2.5}$ µg/m³	Area 3 within site (within 10m of the crushing / screening) 1-hr Average Dust / Particles $PM_{2.5}$ µg/m³	Area 4 within site (within 100m of the crushing / screening) 1-hr Average Dust / Particles $PM_{2.5}$ µg/m³	Occupational Workplace Exposure Limit for Respirable Dust (equivalent to PM_{10}) (from health and Safety Executive EH40) µg/m³	Environmental National Objective / Limits Annual Average
Dust / Particles PM_{10} µg/m³	14.3	12.0	601.3	52.5	4000	40
Dust / Particles $PM_{2.5}$ µg/m³	8.2	6.5	67.1	10.2	N/A	20 (10 to be achieved by 2040)

3.3.3 A comparison of the upwind background (location 2) with the downwind location (location 1) in **Table 1** above shows that the dust/particles from the site (both PM_{10} and $PM_{2.5}$ sizes) are contributing around 2 µg/m³ to the baseline levels. This corroborates the predicted contributions from the site in the modelling work undertaken in August 2022 (Appendix B) – compare **Figure 6-3**. The monitoring also shows that dust / particle levels beyond the site (locations 1 and 2) are significantly within the National Objective Levels of 40 µg/m³ for PM_{10} and 20 µg/m³ for $PM_{2.5}$ and are also within the 10 µg/m³ objective to be achieved by 2040 for $PM_{2.5}$. Furthermore, the measured dust/particle levels within the site are comfortably within the occupational (Workplace) exposure limit of 4000 µg/m³.

Dust / Mud Deposition Observations

3.3.4 During the 14th March 2024 site visit there was no evidence of dust soiling on any of the vegetation along the northern, eastern and southern boundaries of the site, nor on the vegetation or tidal mud/stones on the eastern boundary of the site.

3.3.5 **Figure 3** below shows the extent of water and dust / mud soiling on Ferry Lane from vehicles existing and accessing the site.

Figure 3 – Site Entrance

Noise, Vibration, Odour or Fumes Observations

3.3.6 Short-term noise and odour observations were undertaken at locations 1 and 2 as shown in **Figure 2** above. Noise from the site was perceptible from the site but not discernible above the noise from passing traffic or general background noise at either location. No odour or fumes was detected at the boundary of the site (nor within the site). The materials being processed at the site were inert and non-odorous. No vibration was detected, either on or around the site.

4.0 RELEVANT POLICY, GUIDANCE AND CRITERIA

4.1 INTRODUCTION

4.1.1 A detailed review of relevant national, regional and local policy is contained in Mr Walton's PoE.

4.1.2 The air quality assessment reports previously undertaken and presented in the appendices also contain the relevant air quality policies which are summarised in this section of my PoE.

4.2 NATIONAL POLICY

4.2.1 The National Planning Policy Framework (NPPF), revised December 2023, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF states the following:

4.2.2 Paragraph 180

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) 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 and water quality, taking into account relevant information such as river basin management plans."

4.2.3 Paragraph 192

"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."

4.2.4 Paragraph 194

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

4.2.5 The Planning Practice Guidance (PPG) web-based resource 'Air Quality' was most recently updated by the Ministry for Housing, Communities and Local Government (MHCLG) on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance (Paragraph: 001 Reference ID: 32-001-20191101):

> *"The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO_2).*
>
> *The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:*
>
> - *fine particulate matter ($PM_{2.5}$);*
> - *ammonia (NH_3);*
> - *nitrogen oxides (NO_x);*
> - *sulphur dioxide (SO_2); and*
> - *non-methane volatile organic compounds (NMVOCs).*
>
> *As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."*

4.3 LONDON POLICY

4.3.1 LBoH lies within the Greater London Authority (GLA) Area. The 2021 London Plan addresses the improvement of air quality. Following a review of policies within the 2021 London Plan, the following were identified as being relevant to the operations at the Site from a dust, air quality noise and odour perspective:

4.3.2 *"Policy SD4 The Central Activities Zone (CAZ)*

D. Taking account of the dense nature of the CAZ, practical measures should be taken to improve air quality, using an air quality positive approach where possible (Policy SI 1 Improving air quality) and to address issues related to climate change and the urban heat island effect."

4.3.3 *"Policy D1 London's form, character and capacity for growth*

Boroughs should undertake area assessments to define the characteristics, qualities and value of different places within the plan area to develop an understanding of different areas' capacity for growth. Area assessments should cover the elements listed below:

5) air quality and noise levels."

4.3.4 *"Policy D3 Optimising site capacity through the design-led approach*

Experience

9) help prevent or mitigate the impacts of noise and poor air quality."

4.3.5 *"Policy SI1 Improving Air Quality*

A. 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.

B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1. Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) 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

c) create unacceptable risk of high levels of exposure to poor air quality.

2. In order to meet the requirements in Part 1, as a minimum:

a) Development proposals must be at least air quality neutral

b) 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 retrofitted mitigation measures

c) 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

d) 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.

C. 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:

a) How proposals have considered ways to maximise benefits to local air quality, and

b) What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this

D. 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.

E. 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."

4.3.6 Joint Waste Development Plan Document for the East London Waste Authority Boroughs

Policy W5 states

"Planning permissions for a waste related development will only be granted where it can demonstrate that any impacts of the development can be controlled to achieve levels that will not significantly adversely affect people, land, infrastructure and resources"

The information supporting the planning application must include, where relevant to a development proposal, assessment of the following matters and where necessary, appropriate mitigation should be identified so as to minimise or avoid any material adverse impact and compensate for any loss including:

(i) the release of polluting substances to the atmosphere or land arising from facilities and transport;

(ii) the amount of greenhouse gases produced;

(xi) adverse effects on neighbouring amenity including transport, noise, fumes, vibration, glare, dust, litter, odour and vermin

4.4 HAVERING POLICY

4.4.1 Following a review of the London Borough of Havering Local Plan 2016-2031 (adopted 2021), the following policies concerning air quality were identified:

4.4.2 *"Policy 12: Healthy Communities*

…The Local Plan will promote health and wellbeing by: …

… viii. Seeking environmental improvements, minimizing exposure to pollutants and improving air quality (refer to Policies 33 and 34); …"

4.4.3 *"Policy 24: Transport Connections*

…The Council will work with its partners, including developers, the Mayor of London and central government to improve transport infrastructure and the connectivity of the borough by: …

… xi. Tackling key congestion "hotspots" through remodelling of Gallows Corner and Romford Ring Road to improve motor vehicle traffic flow and improve air quality; …"

4.4.4 *"Policy 33: Air Quality*

…The Council is committed to improve air quality in Havering to improve the health and wellbeing of Havering's residents. The Council will support development which:

i. Is at least air quality neutral;

ii. Optimises the use of green infrastructure to reduce pollution concentrations and exposure (see Policy 29);

iii. Delivers measures to support active travel to reduce emissions (see Policy 23);

iv. Meets the targets for carbon dioxide reduction in the London Plan (see Policy 36); and,

v. Minimises emissions from construction (see Policy 34)."

4.4.5 *"Policy 34: Managing Pollution*

…The Council will support development proposals that:

i. Do not unduly impact upon amenity, human health and safety and the natural environment by noise, dust, odour and light pollution, vibration and land contamination;

ii. Do not pose an unacceptable risk to the quality of the water catchment, groundwater or surface water; and,

iii Optimise the design, layout and orientation of buildings and the use of green infrastructure to minimize exposure to the above pollutants."

4.4.6 Following a review of the Joint Waste Development Plan for the East London Waste Authority Boroughs (adopted 2021), the following policy concerning air quality was identified:

4.4.7 *"Policy W5: General Considerations with regard to Waste Proposals*

Planning permissions for a waste related development will only be granted where it can demonstrate that any impacts of the development can be controlled to achieve levels that will not significantly adversely affect people, land, infrastructure and resources.

…

The information supporting the planning application must include, where relevant to the development proposal, assessment of the following matters and where necessary, appropriate mitigation should be identified so as to minimise or avoid any material adverse impact and compensate for any loss including:

(i) The release of polluting substances to the atmosphere or land arising from facilities and transport;

…

(ix) the visual and landscape impact of the development on the site and surrounding land, including townscape and agricultural land;

…

(xi) adverse effects on neighbouring amenity including transport, noise, fumes, vibration, glare, dust, litter, odour and vermin;

…

(xiii) adverse impacts of all movements including: traffic generation…;

…

(xviii) the management arrangements for residues arising from any waste management facility."

4.5 AIR QUALITY ACTION PLAN AND AIR QUALITY MANAGEMENT AND FOCUS AREAS

4.5.1 Air Quality Management Areas (AQMAs) must be declared by a local authority if they find through their measurement of air pollution (an element of review and assessment of air quality in each area which has been undertaken since 1997) that the national air quality objectives are not likely to be achieved. An AQMA can range in size from a couple of localised streets to much wider areas, and local authorities formulate plans to improve the air quality within these areas (Local Air Quality Action Plan). These plans set out what is required in terms of measures to implement policy to improve air quality, with supplementary planning guidance providing further support to developers in terms of the requirements for building new developments in areas where there are concerns regarding air quality.

4.5.2 LBoH have a borough wide Air Quality Management Area and thus the site lies within this. The latest Havering Air Quality Action Plan (2018-2023) sets out a whole variety of actions that the Borough will undertake to improve air quality. The actions relevant to planning for this type of activity are detailed in section 3.4 *"Adopt and implement planning controls on air quality neutral development. New major developments will be required to be air quality neutral as a minimum".* The current use of this site would be classed as 'waste development' therefore a 'major development' by default.

4.5.3 LBoH have two Air Quality Focus areas (Romford Town Centre and Broadway in Rainham) and thus this site does not lie within an Air Quality Focus Area nor are vehicles from the site likely to pass through these Air Quality Focus Areas.

4.5.4 With regard to the London Air Quality Polices. The site does not lie withing the CAZ (Central Activities Zone) and would be regarded from an Air Quality Neutral point of view as being in 'Outer London'.

5.0 CONSIDERATION OF RELEVANT POLICIES AND PLANNING TESTS

5.0.1 There is some overlap both in terms of policy and of the source apportionment of dust and particulates and other air emissions from the site and thus I consider these effects separately by source.

5.1 CONSIDERATION OF POLICIES REGARDING AIR QUALITY/DUST (FROM OPERATIONAL PLANT AND MACHINERY EMISSIONS)

5.1.1 It is my opinion that the most stringent planning test for plant emissions (airborne emissions including particles etc.) from machinery and plant on this site could be from policy 33 of Havering Local Plan and SI1 2a of the London Plan in that the 'development' should be Air Quality Neutral. However, I believe that this does not apply to the emissions from the machinery and plant on this site.

5.1.2 The Air Quality Neutral guidance requires benchmarks to be met for Building Emissions and Transport Emissions. Section 2.2.2 'Excluded Developments' states that '*Developments that are subject to Environmental Permits, issued either by the Environment Agency or the Borough Council, are subject to the Air Quality Neutral benchmarks for all emission sources within the development not controlled by the Environmental Permit*'. The whole site is/would be subject to an environmental permit and therefore the Air Quality Neutral requirements would not apply. Even if this was interpreted as that only the emissions from the screening, crushing and grading plant are/would be being controlled by an environmental permit, this would leave only the minimal heating and emissions from the temporary generator to be Air Quality Neutral, thus compliant with the GLA and Havering Travel Plan requirements for Air Quality Neutral.

5.1.3 With regard to the heating emissions, there is no Energy Centre or Medium Combustion Plant. Indeed, there is very little localised heating of the buildings and in any event the 'buildings' on the site would fall below the 1000m^2 category (detailed in section 2.3.1 of the Air Quality Neutral Guidance) which would make the site revert back to a Minor Development in terms of Air Quality Neutral and therefore and therefore is '*expected to meet the Air Quality Neutral benchmarks*' and thus compliant with the GLA and Havering Air Quality Action Plan requirements for Air Quality Neutral.

5.1.4 Similarly, with regard to emissions from the temporary generator, the Air Quality Neutral guidance states in section 3.3 that emissions from the temporary generator (which would fall under General Permitted Development) '*do not need to be included*'.

5.1.5 Similarly, I believe that the machinery and plant on site (screening, crushing and grading) would not be classed as NRMM (Non-Road Mobile Machinery) and therefore policies and emission requirements relating to NRMM, which are aimed at construction and demolition activities do not apply.

5.1.6 As such, I consider that emissions from plant and machinery on the site are/would be in compliance with all planning policies and tests.

5.2 CONSIDERATION OF POLICIES REGARDING AIR QUALITY/DUST (FROM VEHICLE EMISSIONS)

5.2.1 It is my opinion that the most stringent planning test for vehicles emissions from site related vehicles on the public highway could be from Policy 33 of Havering Local Plan and SI1 2a of the London Plan in that the 'development' should be Air Quality Neutral. However, again, I believe that this does not apply to the emissions from vehicles from this site.

5.2.2 The Air Quality Neutral guidance is aimed to 'ensure that their transport and building emissions do not worsen air quality in London'. The London Plan Guidance states that '*Air Quality Neutral supports London's continued growth and development by ensuring contributions to the city's overall emissions from all new developments are reduced*'.

5.2.3 I believe that the Air Quality Neutral guidance 'supports London's continued growth' because it specifically does not relate to 'operational trips' and is designed to consider the wider implications of travel to work etc. and not (as sometimes misconstrued) to put a cap on business and trade vehicles.

5.2.4 This is why the TEB (Transport Emissions Benchmark) is defined in this way in section 4.1.4 of the Air Quality Neutral Guidance, which states, '*The TEB only estimates car or light van trips undertaken directly by the development occupiers (residents, businesses etc and their staff / customers). The TEB does not include 'operational' trips generated by the developments. Deliveries and servicing, taxis or heavy vehicle movements from non-occupiers' assessment of these trips, for example, should be captured in the wider air quality impact assessment where one is required and should therefore be excluded from TEB calculations.'*

5.2.5 Section 4.5 of Mr Godhania's Proof shows that there are 48 parking spaces on the site and in section 6.2.3 that the site generates 109 two-way car movements per working day. This would produce approximately 34,000 trips per year. On the basis of a GIA on the site of 900m^2 the benchmark would be 14,400 trips per year.

5.2.6 The Air Quality Neutral Guidance uses planning Land Use classes and GIA (Gross Internal Area) to determine the TEB (Transport Emissions Benchmark). In essence, it looks at the size and use of the building and the number of car parking / staff that should be using that building, (together with whether the site is in the CAZ, inner or outer London) and whether the provision for car parking for staff using that building is likely to be above the benchmark (thus encouraging more private car trips than should be needed) or below the benchmark (this encouraging more sustainable travel).

5.2.7 However, it is my opinion that this method is wholly inappropriate for an open site such at this appeal site where there is vastly more 'use' of the site than the footprint of the buildings on the site. Of course, the 48 parking spaces would be excessive for a small/medium industrial unit (that is effectively assumed by the Air Quality Neutral Calculations for this site) but this site is completely different from a small/medium industrial unit. Given that the site is fully utilised and has an area of 2.782 ha. Even assuming only 25% of the land is 'equivalent to that which would be in a building for a typical industrial use' would produce a TEB of 9655m^2 x 6.5 = 62,757 trips of which the 34,000 trips would comfortably be within.

5.2.8 As such, I consider that the use of the site would be Air Quality Neutral and thus compliant with the GLA and Havering Travel Plan requirements for Air Quality Neutral. Furthermore. even if an unpragmatic approach was used and the site was not considered to be Air Quality Neutral, the next step would be to agree mitigation measures to reduce car trips and encourage use of public transport, for which, I believe the measures set out in Mr Godhania's evidence section 7.2 'Sustainable Measures' would be sufficient for this type of use/site and could be simply enforced by means of a planning condition relating to a travel plan.

5.2.9 It is my opinion that these measures would be suitable to 'minimise any adverse effects' in accordance with policy W5.

5.2.10 On the basis of my opinion that the use of the site is Air Quality Neutral the planning test would then reduce down to the next most stringent policies which are those from SI1:1 and loosely W5 I of the Joint Waste Development Plan for the East London Waste Authority Boroughs (adopted 2021):

"Development proposals should not :

1 Lead to further deterioration of existing poor air quality

2 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.

3 Create an unacceptable risk of high levels of exposure to air quality."

5.2.11 The 2022 full detailed assessment of site traffic on the surrounding sensitive receptors (including ecological receptors) [Appendix A of this proof] considers the 3 points above. It concludes that there will be 'negligible' effects on air quality and will not be any new areas that exceed the air quality limits (see **Table 5.7**). The site does also not introduce new exposure to poor air quality.

5.2.12 As such, I believe the site meets the requirements of these policies with respect to effects of development related traffic.

5.3 CONSIDERATION OF POLICIES REGARDING GENERAL PARTICULATE MATTER/DUST (FROM THE PROCESSING OF INERT WASTE MATERIALS ON THE SITE)

5.3.1 On the basis of my opinion (above) that the use of the site is Air Quality Neutral it is my opinion that the remaining planning test for dust and particles from the site is firstly based on those from SI1:1 which also tie in with W5 I of the Joint Waste Development Plan for the East London Waste Authority Boroughs (adopted 2021) in that :

"Development proposals should not :

1 Lead to further deterioration of existing poor air quality

2 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.

3 Create an unacceptable risk of high levels of exposure to air quality."

5.3.2 Secondly, (in the event that the above tests are met) it would fall to the test for significant effects, i.e. from Policy W5:

"*Planning permissions for a waste related development will only be granted where it can demonstrate that any impacts of the development can be controlled to achieve levels that will not significantly adversely affect people, land, infrastructure and resources*"

5.3.3 And from policy SI8 E:

"Policy SI8 Waste capacity and net waste self-sufficiency

E. Developments proposals for new waste sites or to increase the capacity of existing sites should be evaluated against the following criteria:4) the impact on amenity in surrounding areas (including but not limited to noise, odours, air quality and visual impact) – where a site is likely to produce ***significant*** *air quality, dust or noise impacts, it should be fully enclosed."*

5.3.4 A full and detailed monitoring and modelling assessment of dust and particle emissions from the site (both on Human and Ecological receptors) was undertaken in 2022 and is appended to my proof as Appendix B. This concludes that there would be 'negligible' to 'slight' effects on human and 'negligible' effects on ecological receptors. Despite this conclusion, a dust management plan has been proposed.

5.3.4 Furthermore, the updated monitoring (March 2024) provides a comparison of the upwind background (location 2) with the downwind location (location 1) in **Table 1** above shows that the

dust/particles from the site (both PM_{10} and $PM_{2.5}$ sizes) are contributing around 2 µg/m^3 to the baseline levels. The monitoring also shows that dust/particle levels beyond the site (locations 1 and 2) are significantly within the National Objective Levels of 40 µg/m^3 for PM_{10} and 20 µg/m^3 for $PM_{2.5}$ and are even within the 10 µg/m^3 objective to be achieved by 2040 for $PM_{2.5}$.

5.3.5 As such, I do not believe that the use of the site would 'lead to further deterioration of existing poor air quality action' nor would it '*Create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved (*even for the 2040 $PM_{2.5}$ target*) in areas that are currently in exceedance of legal limits.'*

5.3.6 Based on these findings and assessments and observations it is my opinion that the effects of the dust and particles from the site operations are **NOT significant** and therefore, do not need to be fully enclosed (policy SI8 E) and meet the requirements of policy W5.

5.3.7 Furthermore, the implementation of existing dust management plan provides additional controls and safeguards against the effects of particles and dust from the on-site operations which, I believe will 'minimise any adverse effects' in accordance with policy W5.

5.3.8 As such, I consider that operations on the site with respect to dust and particles are in compliance with all relevant policies.

5.4 CONSIDERATION OF POLICIES REGARDING 'MUD' ON THE ROAD

5.4.1 There are 3 potential effects of mud on the road.

(a) The visual effect of the deposits on the road (this is dealt with by Robin Smithyman)

(b) Safety concerns from the potential skidding caused by mud on the road (this is dealt with by Mr Godhania)

(c) The potential for re-suspension of deposited 'mud' on the road to contribute to air quality effects of the site further from the site boundary. I will consider this.

5.4.2 Based on the recent observations I consider that the wheel washing is effective and that the deposits on the road, although visible, are minimal in terms of volume and extend to a maximum of 100m from the site. It is my opinion that any potential re-suspension of these deposits would be minimal and not significantly greater than general road emissions and definitely less than the 'negligible' emissions of dust and particles from the site as a whole which (see section 5.3 above) are considered to be compliant with all relevant policies. It is considered that the wheel washing facilities and provision of the tractor and water bowser are best practice to 'minimise any adverse effects of mud, (in accordance with policy W5).

5.5 CONSIDERATION OF POLICIES REGARDING NOISE & VIBRATION

5.5.1 The nearest residential receptors are directly 2km south-west across the river at Galleons Close or 1.2km to the north-west at Capstan Drive (beyond further industry and the A13). There is also limited night-time working and as such it is considered very unlikely that there would be any effects of noise or vibration on residential dwellings. Other potential receptors could include workers in nearby industrial and commercial premises and ecological receptors. However, based on the recent March 2024 observations, it is my opinion that is it very unlikely that there would be a significant effect of noise or vibration, which is the planning test in policy SI8 E and that there would be no further requirement to 'minimise any adverse effects' of noise or vibration, in accordance with policy W5.

5.6 CONSIDERATION OF POLICIES REGARDING ODOUR & FUMES

The materials being process on the site are inert and not expected to generate any detectable odour. Observations during the March 2024 visit did not detect any odour. 'Fumes' from plant and equipment exhausts (including the temporary generator) were not visible during the March 2024 visit nor were they odorous. It is my opinion that is it very unlikely that there would be a significant effect of odour and fumes, which is the planning test in policy SI8 E and that there would be no further requirement to 'minimise any adverse effects' of odour or fumes, in accordance with policy W5.

5.7 CONSIDERATION OF POLICIES REGARDING GREENHOUSE GASES

5.7.1 The operations are simple and the only significant source of CO_2 and greenhouse gases from the site operations are from the vehicles (including HGV's and staff cars) together with any processing equipment powered by the temporary generator. A worst-case approximation of total annual CO_2 emissions from all operations, including vehicle trips on the highway network is 1270 tonnes CO_2e per year. It is my understanding that all of the HGV fleet are EURO VI vehicles. As such, it is my opinion that there would be no significant options to further 'minimise any adverse effects' of greenhouse gases, in accordance with policy W5.

5.8 CONSIDERATION OF POLICIES REGARDING GLARE

5.8.1 There are no significant areas of metallic or glass rooves or surfaces within 45° of horizontal (other than staff vehicles) and the products being processed are non-reflective, as such, despite being within the flight path for London City Airport, there is not expected to be any significant glare effects. As such, it is my opinion that is it very unlikely that there would be a significant glare effects, and that there would be no further requirement to 'minimise any adverse effects' of glare, in accordance with policy W5.

6.0 PLANNING CONDITIONS

6.1 SUGGESTED PLANNNING CONDITIONS

6.1.1 I consider that the following suggested Planning Conditions are appropriate for the operational activity being undertaken and will provide the controls necessary demonstrate and maintain there will be no adverse effects resulting from the development (in accordance with policy W5) whilst also providing appropriate mitigation.

6.1.2 Updated AQA informed by Transport Assessment

Within one month of the decision of this appeal an updated Air Quality Assessment should be undertaken to account for the finalised Transport Assessment and submitted for approval by the LPA.

Reason : Air quality assessments should show how the development will meet the requirements of London Plan policy SI 1 B1.

6.1.3 Travel Plan

Within one month of the decision of this appeal a Travel Plan should be undertaken and submitted for approval by the LPA and adhered to following commencement.

Reason : Transport impact of all movements, including opportunities for use of sustainable transport modes, traffic generation, access and the suitability of the highway network in the vicinity, access to and from the primary route network should be minimised in accordance with policy W5 of the the Joint Waste Development Plan for the East London Waste Authority Boroughs (adopted 2021)

6.1.4 Implementation of Existing Dust Management Plan

Within one month of the decision of this appeal a Dust Management Plan and submitted for approval by the LPA and adhered to following commencement.

Reason : The development will need to meet the requirements of London Plan policy SI 1 B1.

7.0 SUMMARY AND CONCLUSIONS

7.1 SUMMARY

7.1.1 A large amount of monitoring and modelling of dust, particulates and air quality has been previously undertaken for this site. Together with recent monitoring and observations, I have considered the results of these assessments in accordance with current policy and guidance.

7.1.2 I have considered separately the effects of the site operations as follows :

(1) Air Quality / Dust from Operational Plant and Machinery Emissions;

(2) Air Quality / Dust from Vehicle Emissions ;

(3) General Particulate / Dust from Processing of Inert Waste Materials on the Site;

(4) A partial consideration of 'Mud' on the road;

(5) Noise and Vibration;

(6) Odour and Fumes;

(7) Greenhouse Gases; and,

(8) Glare.

7.2 CONCLUSIONS

7.2.1 **Air Quality Dust and Particles**

With regard to Air Quality and Dust Effects of emissions from plant, equipment and vehicles, it is my assessment that the site should be considered to be Air Quality Neutral and as such, compliant with the planning tests and policies of the GLA and Havering Air Quality Action Plan requirements for Air Quality Neutral.

I also consider that my evidence demonstrates that the tests of the London Plan Policy SI1 that :

Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) 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

have also been met.

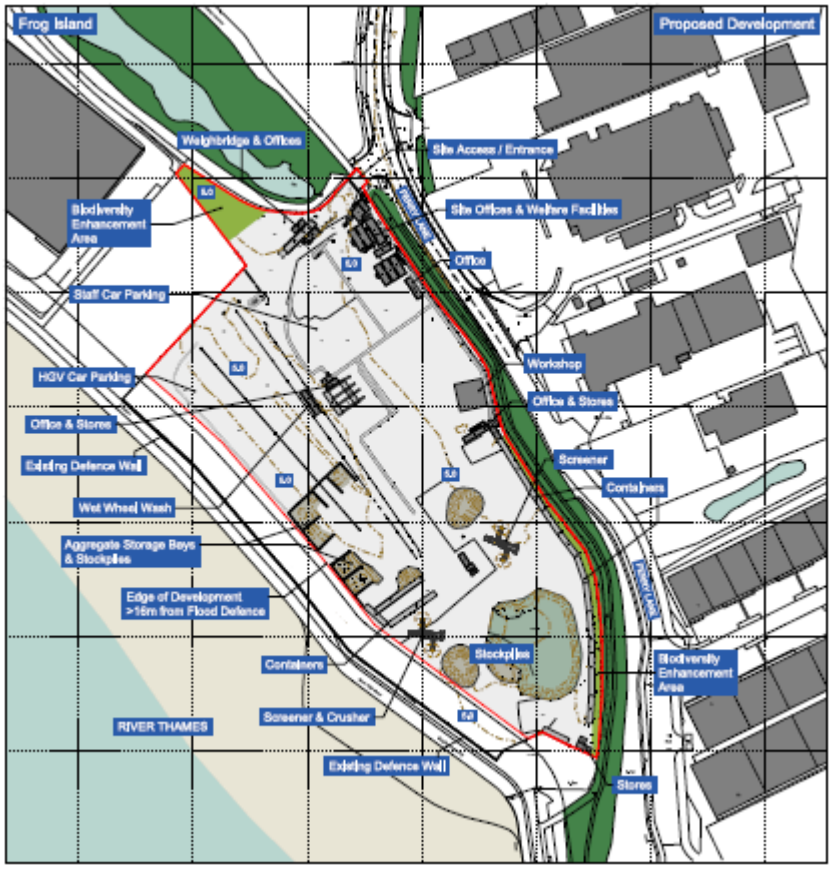
Similarly, my evidence demonstrates that there are no significant effects of the site operations with respect to Air Quality or Dust and Particles emissions (thus also being compliant with policy SI8 E) and that there would be no further requirements (above the existing Dust Action Plan and Mr Godhania's 'Sustainable Measures' to 'minimise any adverse effects' of air quality, dust and particles to be in accordance with policy W5 of the Joint Waste Development Plan for the East London Waste Authority Boroughs (adopted 2021).

7.2.2 **Mud on the Road, Noise and Vibration, Odour and Fumes, Greenhouse Gases and Glare**

My evidence demonstrates that none of the above potential or known effects are significant and thus the operations at the site would be compliant with the planning tests in London Plan policy SI8 E and also that there would be no further requirement to 'minimise any adverse effects' of the above, in accordance with policy W5 of the Joint Waste Development Plan for the East London Waste Authority Boroughs (adopted 2021).

APPENDIX A – FROG ISLAND DETAILED TRAFFIC AIR QUALITY ASSESSMENT – TETRA TECH – SEPTEMBER 2022

Frog Island, Ferry Lane South, Rainham, RM13 9DB



Air Quality Assessment

784-B034776
20th September 2022

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Description of revision: Update on the Red Line Boundary.			

EXECUTIVE SUMMARY

This report presents the findings of an air quality assessment undertaken to assess road traffic emission impacts in support of a planning application to regularize the existing operation on the site of Frog Island, Ferry Lane South, Rainham, RM13 9DB.

Operational Phase

Detailed dispersion modelling of traffic pollutants has been undertaken for the proposed development. An operational year assessment for 2023 traffic emissions has been undertaken to assess the effects of the Proposed Development. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

The long-term (annual) assessment of the effects associated with the proposed development with respect to Nitrogen Dioxide (NO_2) is determined to be 'negligible'. With respect to PM_{10} and $PM_{2.5}$ exposure, the effect is determined to be 'negligible' at all identified existing sensitive receptor locations.

The maximum predicted increase in the annual average exposure to NO_X at the identified ecological receptor, due to changes in traffic movements associated with the development, is 1.17 µg/m^3 at Inner Thames Marshes (SSSI) (D39) which is above the 0.40 µg/m^3 development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2020.

A full nitrogen deposition assessment was undertaken for ecological receptors D39 and D41 due to a development NO_x contribution of >0.40 µg/m^3. There were no predicted significant impacts on nitrogen deposition at receptors D39 and D41 as a result of the proposed development.

The proposed development will not include installation of CHP or other heat source emissions for buildings. The development trip rate is below the transport emissions benchmark. As a result, the proposed development can be considered Air Quality Neutral.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AADT	Annual Average Daily Traffic
ADMS	Atmospheric Dispersion Modelling Software
AQAL	the Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
CHP	Combined Heat and Power
CL	Critical Level
CO	Carbon Monoxide
DEFRA	Department for Environment Food & Rural Affairs
EAL	Environmental Assessment Limits
EC	European Commission
EFT	The Emissions Factors Toolkit
EPUK	Environmental Protection UK
EU	European Union
EPAQS	The Expert Panel on Air Quality Standards
IAQM	The Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	The United Kingdom National Grid Reference
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
PC	Process Contribution
MHCLG	the Ministry for Housing, Communities and Local Government
NPPF	The National Planning Policy Framework
OS	the UK Ordnance Survey
PEC	Predicted Environment Concentration
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
SAC	Special Areas of Conservation
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
VOC	Volatile organic compounds
WHO	World Health Organization
UK	The United Kingdom

1.0 INTRODUCTION

This report presents the findings of an air quality assessment undertaken to assess road traffic emission impacts in support of a planning application for to regularize the existing operation on the site of Frog Island, Ferry Lane South, Rainham, RM13 9DB.

1.1 SITE LOCATION

The central Grid Reference is approximately 551233,180871. The application site is bounded to the north and east by commercial and industrial properties situated along Ferry Lane, and to the south and west by the River Thames.

Reference should be made to **Figure 1-1** for a map of the application site and surrounding area.

Figure 1-1. Satellite Image of Site and Surrounding Area

Google Imagery (2022)

1.2 CONTEXT

The primary source of the air quality associated with the proposed scheme is from vehicle movements, arriving and departing the proposed development. The traffic data generated by the development has been assessed at the surrounding sensitive receptors.

The following assessment stages have been undertaken as part of this assessment:

- Baseline evaluation;
- Assessment of potential air quality impacts during the operational phase;
- Air Quality Neutral Assessment; and
- Identification of mitigation measures (as required).

The results of the assessment are detailed in the following sections of this report.

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}) and less than 2.5 µm ($PM_{2.5}$) as a result of the development at key local receptor locations. The changes have been referenced to EU air quality limits and UK air quality objectives and the magnitude and impact description of the changes have been referenced to non-statutory guidance issued by the IAQM and Environmental Protection UK (EPUK).

1.3 REPORT STRUCTURE

Following this introductory section, the remainder of this report is structured as follows:

- Section 2: Policy and Legislative Context
- Section 3: Assessment Methodology
- Section 4: Baseline Conditions
- Section 5: Assessment of Air Quality Impacts – Operational Phase
- Section 6: Air Quality Neutral Assessment
- Section 7: Mitigation
- Section 8: Conclusions

All technical Appendices are included at the end of this report for information.

2.0 POLICY AND LEGISLATIVE CONTEXT

2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised July 2021;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, 2007;
- The Environment Act, 1995;
- The Environment Act, 2021;
- London Local Air Quality Management Technical Guidance LLAQM.TG19, Mayor of London, 2019;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, LA 105 Air quality, Highways England, November 2019;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1), IAQM, May 2020;
- Ecological Assessment of Air Quality Impacts, CIEEM, January 2021.
- Greater London Authority (GLA) London Environment Strategy, May 2018;
- Greater London Authority (GLA) The London Plan, March 2021;
- Air Quality Neutral Planning Support Guidance, Greater London Authority, 2014;and
- London Planning Guidance, Air Quality Neutral, Consultation Draft November 2021.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport: Road Traffic Statistics (https://roadtraffic.dft.gov.uk/);
- Multi-Agency Geographic Information for the Countryside (http://magic.defra.gov.uk/);
- Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/); and,
- London Borough of Havering (https://www.havering.gov.uk).

Site Specific Reference Documents

- London Borough of Havering, Air Quality Annual Status Report 2020;
- London Borough of Havering, Air Quality Action Plan 2018-2023; and,
- London Borough of Havering, Local Plan 2016-2031 (adopted 2021).

2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality 'Daughter' Directive – sets ambient air limit values for NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **Directive 2000/69/EC** – the Second Air Quality 'Daughter' Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality 'Daughter' Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in Scotland, Wales and Northern Ireland.

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

UK Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amends the AQO for $PM_{2.5}$ outlined within the Air Quality Standards Regulations (2010 & 2016 Amendments).

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in **Table 2-1** and **Table 2-2** along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines. The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

Table 2-1. Air Quality Standards, Objectives, Limits and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50µg/m^3 by end of 2004 (max 35 exceedances a year)	24-hour Mean	1st January 2005	50µg/m^3 by end of 2004 (max 35 exceedances a year)	1st January 2005	Retain Existing
	UK	40µg/m^3 by end of 2004	Annual Mean	1st January 2005	40µg/m^3	1st January 2005	
$PM_{2.5}$	UK	20µg/m^3	Annual Mean	1st January 2020	-	-	Retain Existing
NO_2	UK	200µg/m^3 not to be exceeded more than 18 times a year	1-Hour Mean	31st December 2005	200µg/m^3 not to be exceeded more than 18 times a year	1st January 2010	Retain Existing
	UK	40µg/m^3	Annual Mean	31st December 2005	40µg/m^3	1st January 2010	

Table 2-2. Ecological Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as
NO_x	UK	30µg/m^3	Annual Mean

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA).

Environment Act 2021

The Environment Act (2021) introduces a commitment to create a legally binding duty on government to reduce the concentrations of fine particulate matter ($PM_{2.5}$) in ambient air, and to set a long-term target expected to be 10 µg/m^3, a reduction from the current Air Quality objective of 20 µg/m^3 set out within the Air Quality Standards Regulations (Amendment 2016). A draft of a statutory instrument (or drafts of statutory instruments) containing regulations setting the $PM_{2.5}$ air quality target must be laid before Parliament on or before 31st October 2022 and is expected to come into force thereafter.

2.3 PLANNING AND POLICY GUIDANCE

National Policy

The National Planning Policy Framework (NPPF), revised July 2021, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF states that:

Paragraph 174

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *e) 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 and water quality, taking into account relevant information such as river basin management plans."*

Paragraph 186

> *"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."

Paragraph 188

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

The Planning Practice Guidance (PPG) web-based resource was updated by the Ministry for Housing, Communities and Local Government (MHCLG) on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance (Paragraph: 001 Reference ID: 32-001-20191101):

"The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO_2).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:

- *fine particulate matter ($PM_{2.5}$);*
- *ammonia (NH_3);*
- *nitrogen oxides (NO_x);*
- *sulphur dioxide (SO_2); and*
- *non-methane volatile organic compounds (NMVOCs).*

As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."

Regional Policy

The London Borough Havering (LBoH) lies within the Greater London Authority (GLA) Area. The new London Plan addresses the improvement of air quality. Following a review of policies within the new Local Plan, the following were identified as being relevant to the proposed development from an air quality perspective:

"Policy SD4 The Central Activities Zone (CAZ)

D. Taking account of the dense nature of the CAZ, practical measures should be taken to improve air quality, using an air quality positive approach where possible (Policy SI 1 Improving air quality) and to address issues related to climate change and the urban heat island effect."

"Policy D1 London's form, character and capacity for growth

A. Boroughs should undertake area assessments to define the characteristics, qualities and value of different places within the plan area to develop an understanding of different areas' capacity for growth. Area assessments should cover the elements listed below:
5)air quality and noise levels."

"Policy D3 Optimising site capacity through the design-led approach

Experience

9) help prevent or mitigate the impacts of noise and poor air quality."

"Policy E5 Strategic Industrial Locations (SIL)

D. Development proposals within or adjacent to SILs should not compromise the integrity or effectiveness of these locations in accommodating industrial type activities and their ability to operate on a 24-hour basis. Residential development adjacent to SILs should be designed to ensure that existing or potential industrial activities in SIL are not compromised or curtailed. Particular attention should be given to layouts, access, orientation, servicing, public realm, air quality, soundproofing and other design mitigation in the residential development."

"Policy E7 Industrial intensification, co-location and substitution

D. The processes set out in Parts B and C above must ensure that: f)) air quality, including dust, odour and emissions and potential contamination."

"Policy SI1 Improving Air Quality

A. 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.

B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1. Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) 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

c) create unacceptable risk of high levels of exposure to poor air quality.

2. In order to meet the requirements in Part 1, as a minimum:

a) Development proposals must be at least air quality neutral

b) 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 retrofitted mitigation measures

c) 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

d) 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.

C. 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:

a) How proposals have considered ways to maximise benefits to local air quality, and

b) What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this

D. 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.

E. 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."

***"**Policy SI8 Waste capacity and net waste self-sufficiency*

E. Developments proposals for new waste sites or to increase the capacity of existing sites should be evaluated against the following criteria:4) the impact on amenity in surrounding areas (including but not limited to noise, odours, air quality and visual impact) – where a site is likely

to produce significant air quality, dust or noise impacts, it should be fully enclosed."

"Policy T6.2 Office Parking

D. Outer London boroughs wishing to adopt more generous standards are required to do so through an evidence-based policy in their Development Plan that identifies the parts of the borough in which the higher standards will be applied, and justifies those standards, including:

3) the impact on congestion and air quality locally and on neighbouring boroughs and districts outside London as appropriate."

"Policy T8 Aviation

B. The environmental and health impacts of aviation must be fully acknowledged and aviation-related development proposals should include mitigation measures that fully meet their external and environmental costs, particularly in respect of noise, air quality and climate change. Any airport expansion scheme must be appropriately assessed and if required demonstrate that there is an overriding public interest or no suitable alternative solution with fewer environmental impacts.

C. The Mayor will oppose the expansion of Heathrow Airport unless it can be shown that no additional noise or air quality harm would result, and that the benefits of future regulatory and technology improvements would be fairly shared with affected communities."

Local Policy

Following a review of the London Borough of Havering Local Plan 2016-2031 (adopted 2021), the following policy concerning air quality was identified.

"Policy 12: Healthy Communities

…The Local Plan will promote health and wellbeing by: …

… viii. Seeking environmental improvements, minimizing exposure to pollutants and improving air quality (refer to Policies 33 and 34); …"

"Policy 24: Transport Connections

…The Council will work with its partners, including developers, the Mayor of London and central government to improve transport infrastructure and the connectivity of the borough by: …

… xi. Tackling key congestion "hotspots" through remodelling of Gallows Corner and Romford Ring Road to improve motor vehicle traffic flow and improve air quality; …"

"Policy 33: Air Quality

…The Council is committed to improve air quality in Havering to improve the health and wellbeing of Havering's residents. The Council will support development which:

i. Is at least air quality neutral;

ii. Optimises the use of green infrastructure to reduce pollution concentrations and exposure (see

Policy 29);

iii. Delivers measures to support active travel to reduce emissions (see Policy 23);

iv. Meets the targets for carbon dioxide reduction in the London Plan (see Policy 36); and,

v. Minimises emissions from construction (see Policy 34).”

“Policy 34: Managing Pollution

…The Council will support development proposals that:

i. Do not unduly impact upon amenity, human health and safety and the natural environment by noise, dust, odour and light pollution, vibration and land contamination;

ii. Do not pose an unacceptable risk to the quality of the water catchment, groundwater or surface water; and,

iii Optimise the design, layout and orientation of buildings and the use of green infrastructure to minimize exposure to the above pollutants.”

3.0 ASSESSMENT METHODOLOGY

There is potential for environmental effects during the operational phase of the proposed development due to emissions from proposed vehicle movements. The significance of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017 '*Land-Use Planning & Development Control: Planning for Air Quality*' and May 2020 '*A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*'.

3.1 DETERMINING IMPACT DESCRIPTION OF THE AIR QUALITY EFFECTS

The impact description of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall impact description of the air quality effects based on severity of air quality impacts.

The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The effects are provided as a percentage of the Air Quality Objective (AQO), which may be an AQO, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
2. The absolute concentrations are also considered in terms of the AQO and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQO;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQO will have higher severity compared to a relatively large change at a receptor which is significantly below the AQO;
4. The effects can be adverse when pollutant concentrations increase or beneficial when concentrations decrease as a result of development;
5. The judgement of overall impact description of the effects is then based on severity of effects on all the individual receptors considered; and,
6. Where a development is not resulting in any change in emissions itself, the impact description of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQO.

Table 3-1. Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2-5	6-10	>10
≤75% of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109 of AQO	Moderate	Moderate	Substantial	Substantial
≥110 of AQO	Moderate	Substantial	Substantial	Substantial

In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance, the Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

3.2 ESTIMATING HOURLY AND DAILY MEAN CONCENTRATIONS

The latest Local Air Quality Management (LAQM) Technical Guidance TG(16) has been used for predicting 1 hourly and 24-hourly pollutant concentrations.

The guidance states that the one hour mean NO_2 AQO of 200 ug/m^3 is not likely to be exceeded at any roadside locations if the annual mean concentration is below 60ug/m^3. Therefore, this assessment evaluates the likelihood of exceeding the hourly average NO_2 objective by comparing predicted annual average NO_2 concentrations at all receptors to an annual average equivalent threshold of 60 µg/m^3 NO_2. Where predicted concentrations are below this value, it can be concluded that the hourly average NO_2 objective is likely to be achieved.

In accordance with the guidance, the short term 24 hourly PM_{10} mean concentrations can be calculated using the following equation as presented below.

$$\boldsymbol{Number\ of\ 24\ hour\ mean\ exceedances = 18.5 + 0.00145\ x\ annual\ mean^3 + \left(\frac{206}{annual\ mean}\right)}$$

4.0 BASELINE CONDITIONS

4.1 AIR QUALITY REVIEW

This section provides a review of the existing air quality in the vicinity of the application site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the application site has been defined from several sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, London Borough of Havering (LBoH) has undertaken an ongoing exercise to review and assess air quality within its area of jurisdiction.

The assessments have indicated that concentrations of NO_2 are above the relevant AQOs at one location of relevant public exposure within LBoH that is shown below.

Table 4-1. Local Authority AQMA Details

8	Description	Date Declared	Date Amended	Pollutants Declared
Havering AQMA	An area encompassing the entire London Borough of Havering	11/09/2006	N/A	Nitrogen Dioxide NO2, Particulate Matter PM10

The proposed development site is situated within the Havering AQMA, therefore existing receptors within the AQMA have been included as part of the modelling assessment.

However, it should be noted that the extent of this AQMA is based on work undertaken in 2006 and therefore potentially out of date.

As such, the modelling work in this assessment, which is verified to local monitoring, should be considered to be a more precise and up to date assessment of pollutant levels at the site. The assessment considers potential exposure to pollutants by future occupiers rather than simply considering the extent of the AQMA represents a theoretical delineation of harm. It should be also noted that the AQMA is a management area, where pollutant levels should be 'managed' by the local authority air quality action plan and should not be considered to be a planning constraint in itself.

Air Quality Monitoring

Monitoring of air quality within LBoH has been undertaken through both automatic and non-automatic monitoring methods in 2019. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the application site. The most recent monitoring data within LBoH was undertaken during 2019.

Automatic Monitoring

LBoH undertook automatic pollution monitoring during 2019 at 2 different locations. The closest monitoring location is HV1, which is located at Rainham, approximately 2.4km north-east of the application site. The most recently available data is from 2019 which is presented in **Table 4-2**.

Table 4-2. Monitored Annual Mean Pollutant Concentrations at Automatic Monitoring Locations

Site ID	Location	Site Type	Distance from Kerb of Nearest Road (m)	Inlet Height (m)	2019 NO_2 Annual Mean Concentration ($\mu g/m^3$)	2019 PM_{10} Annual Mean Concentration ($\mu g/m^3$)	2019 $PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$)
HV1	Rainham	Roadside	10	3	29.1	17.4	11.1
HV3	Romford	Roadside	8	3	35.8	20.5	N/A
*Located within AQMA							

As outlined in **Table 4-2**, both monitoring locations monitored annual average concentrations below the AQO for NO_2 (40 $\mu g/m^3$ annual mean), PM_{10} (40 $\mu g/m^3$ annual mean), and $PM_{2.5}$ (20 $\mu g/m^3$ annual mean) during 2019.

Non - Automatic Monitoring

LBoH operated a network of 46 passive diffusion tubes during 2019. The closest diffusion tube is diffusion tube HAV56, which is located at Rainham Tesco, approximately 1.6 km north-east of the application site. The most recently available diffusion tube data is from 2019 which is presented in **Table 4-3**.

Table 4-3. Monitored Annual Mean NO_2 Concentrations at Diffusion Tubes

Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	Monitored 2019 Annual Mean NO_2 Concentration ($\mu g/m^3$)
HAV46	Rainham Village School	Kerbside	1.0	2.0	30.0
HAV50	Blewitts Cottages	Kerbside	0.5	2.0	36.6
HAV56	Rainham Tesco	Kerbside	1.0	2.0	37.8
*Located within AQMA					

As indicated in **Table 4-3**, all diffusion tubes located within the Air Quality Assessment area monitored annual average NO_2 concentrations below the AQO for NO_2 (40 $\mu g/m^3$ annual mean) during 2019.

It should be noted that as part of the model verification a review of diffusion tubes locations and monitoring heights was undertaken. As part of this process, the locations and monitoring heights were adjusted following desk-based review using Google Maps.

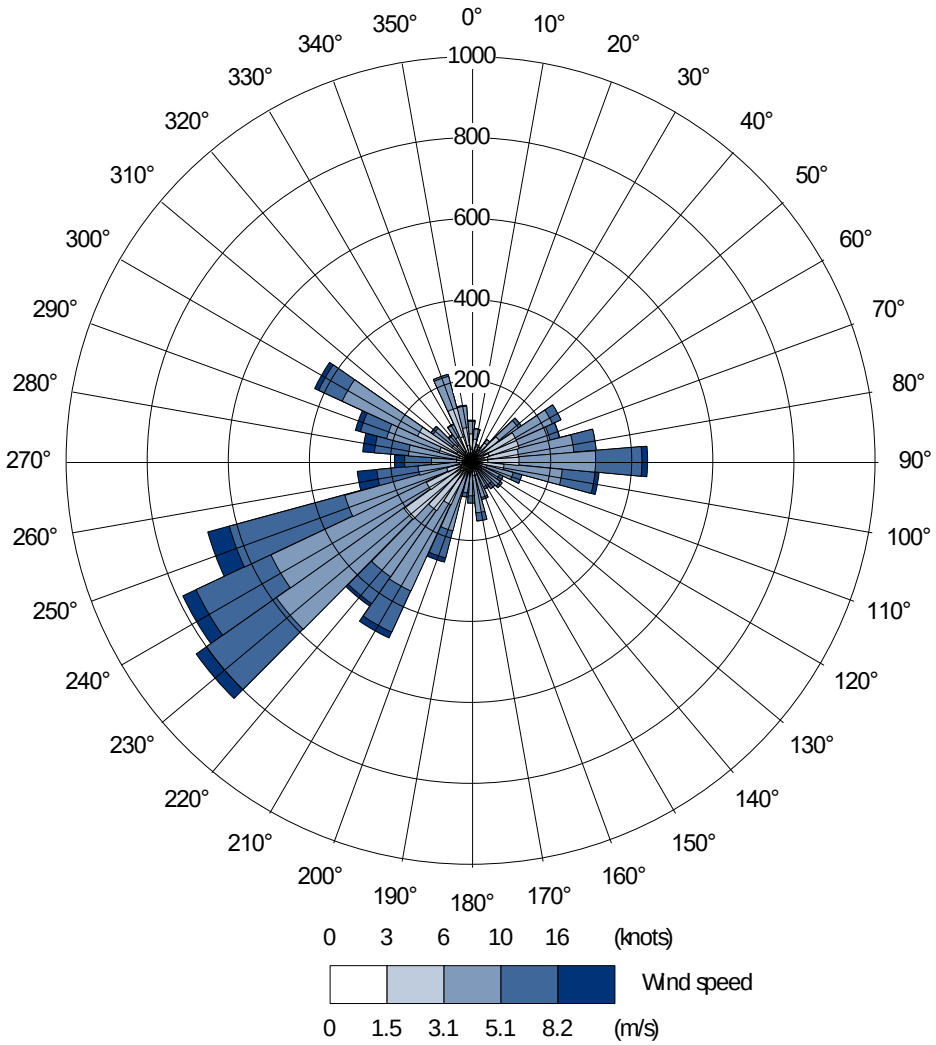
Figure 4-1. Local Authority Monitoring Locations

4.2 METEOROLOGY

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS (Atmospheric Dispersion Modelling System) model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data.

The 2019 meteorological data used in the assessment is derived from London City Airport Meteorological Station. This is the nearest meteorological station, which is considered representative of the application site, with all the complete parameters necessary for the ADMS model. Reference should be made to **Figure 4-2** for an illustration of the prevalent wind conditions at London City Airport Meteorological Station site.

Figure 4-2. London City Airport 2019 Wind Rose



4.3 EMISSION SOURCES

A desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are NO_2, PM_{10} and $PM_{2.5}$.

The assessment has therefore modelled all roads within the immediate vicinity of the application site which are considered likely to experience significant changes in traffic flow as a result of the proposed development. Reference should be made to **Figure A-1** for a graphical representation of the traffic data utilised within the ADMS Roads 5.0.1.3 model.

It should be noted that the pollutant contribution of minor roads and rail sources that are not included within the dispersion model is considered to be accounted for via the use of background air quality levels.

4.4 SENSITIVE RECEPTORS

Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the proposed development.

The existing receptor locations are summarised in **Table 4-4** and the spatial locations of all of the receptors are illustrated in **Figure 4-3**.

Table 4-4. Modelled Sensitive Receptor Locations

Existing Sensitive Receptor		X	Y	Receptor Height (m)
D1	8 Manstead Gardens Rainham (residential)	552835	181399	1.5
D2	6 River Close Rainham (residential)	552701	181532	1.5
D3	56 Elizabeth Road (residential)	552530	181677	1.5
D4	15 Palliser Drive Rainham (residential)	552341	181862	1.5
D5	21 Broadway, Rainham (residential)	552028	182193	1.5
D6	Flat 49 Dunedin Road (residential)	551717	182662	1.5
D7	2a Phillip Road (residential)	551345	182782	1.5
D8	107 New Road (residential)	550865	182912	1.5
D9	162 Oval Road South Dagenham	550089	183178	1.5
D20	H Smith Food Group	551456	180684	1.5
D21	Quantum Group	551437	180778	1.5
D22	The EA MMF10 [a]	551338	180903	1.5
D23	Thermit Welding on Ferry Lane	551364	180936	1.5
D24	TotalFood Distribution Ltd	551284	181110	1.5
D25	Shanks Municipal waste Management	551128	180942	1.5
D26	Footpath	551483	181022	1.5
D27	River Thames	551182	180732	1.5
D30	Harris Academy Rainham	552962	181844	1.5
D31	Rainham Village Primary School and Nursery	552403	182330	1.5
D32	New Beginnings Day Nursery	552379	182056	1.5
D33	Health Centre, Upminster Road South	552515	182368	1.5
D34	Playways Pre-School	552502	182011	1.5
D35	Frankphil Childcare	552130	182098	1.5
D36	The Cottage Pre-School Nursery	552095	182302	1.5
D37	Glebe House (Residential)	553035	182556	1.5
D38	3714 New Road (Residential)	553119	182465	1.5

Twenty-eight existing sensitive receptors have been assessed to determine the effect of air quality, associated with the proposed development. The locations of the receptor are identified on **Figure 4-3**.

4.5 ECOLOGICAL RECEPTORS

Air quality impacts associated with the proposed re-development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The IAQM guidance on 'Air Quality Impacts on Designated

Nature Conservation Sites' (2020) outlines the types of designated nature sites within 2 km of the proposed development which require air quality assessment. These are inclusive of;

- Sites of Special Scientific Interest (SSSIs);
- Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Ramsar Sites;
- Areas of Special Scientific Interest (ASSIs);
- National Nature Reserves (NNRs);
- Local Nature Reserves (LNRs);
- Local Wildlife Sites (LWSs); and,
- Areas of Ancient Woodland (AW).

The Conservation of Habitats and Species Regulations (2019) additionally requires competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Protection Areas).

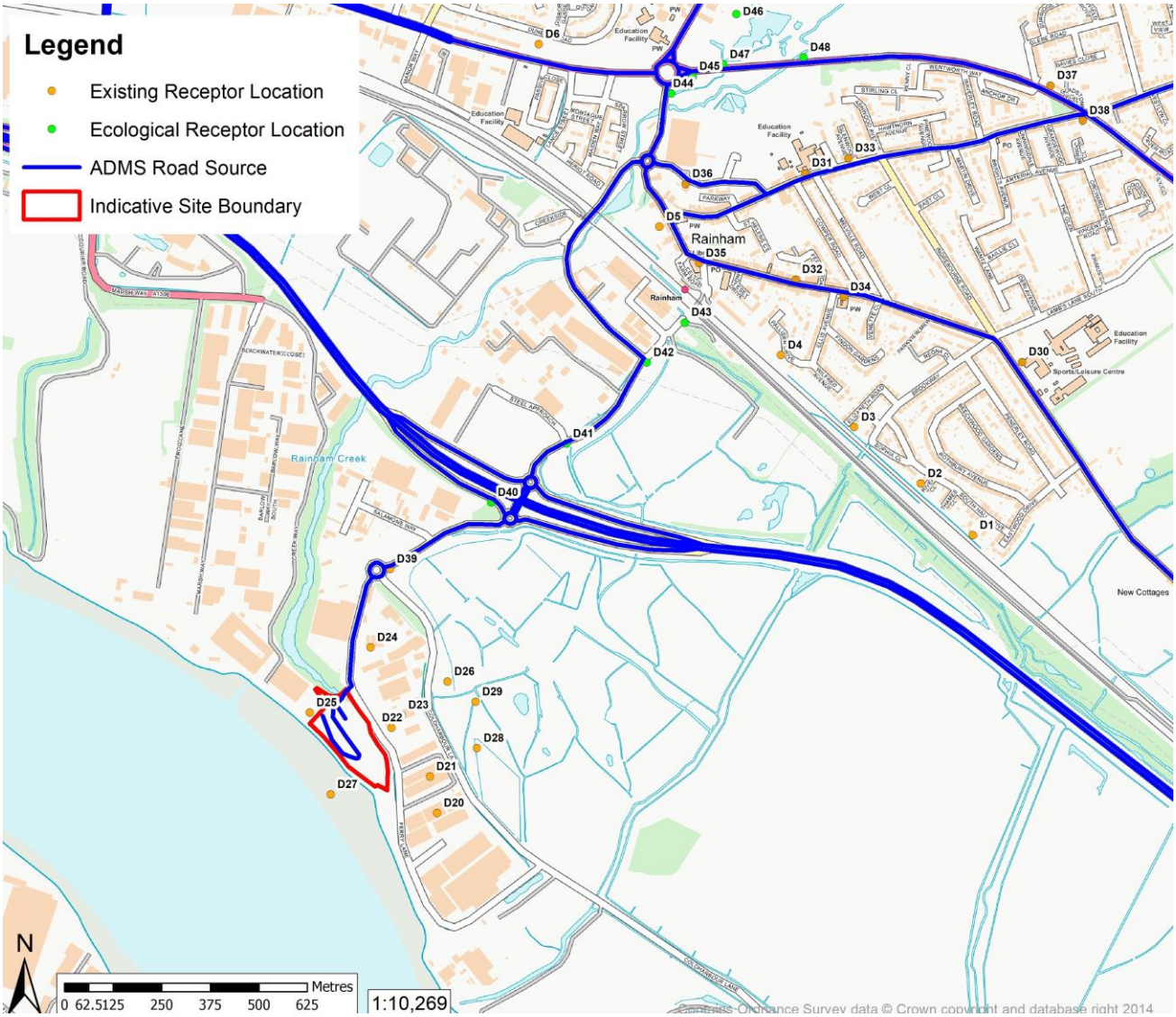
A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations. Following a search within a 2 km radius of the site boundary, the following ecological receptors were identified.

Table 4-5. Ecological Sensitive Receptor Locations

Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Nearest Affected Road (m)
			X	Y		
D27	River Thames SINC/ Tidal Tributaries SINC	SINC	551182	180732	0.07	109
D28	Rainham Marshes	LNR	551558	180851	0.2	303
D29	Inner Thames Mashes	SSSI	551555	180970	0.3	322
D39	Inner Thames Mashes	SSSI	551335	181312	0.3	10
D40	Inner Thames Mashes	SSSI	551595	181483	0.6	10
D41	Inner Thames Mashes	SSSI	551789	181634	0.8	10
D42	Inner Thames Mashes	SSSI	551996	181843	1.1	10
D43	Inner Thames Mashes	SSSI	552093	181946	1.3	139
D44	Ingrebourne Marshes	SSSI	552058	182535	1.7	10
D45	Ingrebourne Marshes	SSSI	552114	182579	1.8	10
D46	Ingrebourne Marshes	SSSI	552226	182740	2.0	96
D47	Ingrebourne Marshes	SSSI	552192	182610	1.8	10
D48	Ingrebourne Marshes	SSSI	552399	182628	2.0	10

It should be noted that the IAQM Guidance only requires the assessment of ecological receptors which are located within 200 m of the affected road network. Therefore, ecological receptors D28 and D29 have been scoped out of this assessment. All other ecological receptors have been scoped into the assessment.

Figure 4-3. Sensitive Receptor Locations



5.0 ASSESSMENT OF AIR QUALITY IMPACTS - OPERATIONAL PHASE

In the context of the proposed development, road traffic is identified as the dominant emission source that is likely to cause potential risk of exposure of air pollutants at receptors.

The operational phase assessment therefore consists of the quantified predictions of the change in NO_2, PM_{10} and $PM_{2.5}$ for the operational phase of the development due to changes in traffic movement. Predictions of air quality at the site have been undertaken for the operational phase of the development using ADMS Roads.

In accordance with the provided traffic data, the operational phase assessment has been undertaken with an assumed operational opening year of 2023 The assessment scenarios are therefore:

- 2019 Baseline = Existing Baseline Conditions (2019);
- 2023 'Do Minimum' = Baseline Conditions + Committed Development Flows (through local growth factor); and,
- 2023 'Do Something' = Baseline Conditions + Committed Development (through local growth factor) + Proposed Development.

5.1 EXISTING AND PREDICTED TRAFFIC FLOW

Baseline 2019 traffic data, projected 2023 'Do Minimum' and 'Do Something' traffic data, and average vehicle speeds have been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT). Development traffic flows have been provided by The Hurlstone Partnership.

Baseline 2019 traffic data was derived from the London Air Emissions Inventory (LAEI) 2019 dataset. Where road links were missing, traffic data was downloaded from the Department for Transport (DfT) website.

The proposed development opening year is assumed to be a worst-case year of 2023. To determine the traffic flows for the 2023 'Do Minimum' traffic flows, a TEMPro factor of 1.0498 has been applied to the 2019 Baseline traffic data. It should be noted that the proposed use of the site will generate fewer vehicle movements (both cars and HGVs) than the current use of the site, resulting in a net reduction in traffic as per the Transport Statement. However, as a worst-case the Do Minimum traffic flows have been modelled assuming the absence of the site, in order to calculate the process contribution of the proposed development traffic.

To calculate the 2023 'Do Something' operational year traffic flows, the proposed development traffic flows have been distributed across the model area and have been added onto the 2023 'Do Minimum' scenario flows.

Emission factors for the 2019 baseline and 2023 projected 'Do Minimum' and 'Do Something' scenarios have been calculated using the Emission Factor Toolkit (EFT) Version 11.0 (November 2021).

It is assumed the average vehicle speeds on the local road network in an opening year of 2023 will be broadly the same as the ones in 2019. A 50 m 20 km/hr slow down phase is included on each link at every junction and roundabout within the assessment. All of the roads within the dispersion model are illustrated in **Figure A-1**. Detailed traffic figures are provided in the **Table 5-1**.

Table 5-1. Traffic Data

Link	Speed (km/h)	2019 Baseline		2023 Do Minimum		2023 Do Something	
		AADT	HGV %	AADT	%HGV	AADT	%HGV
Site Access	16	444	34.23	0	0.00	310	48.39
Ferry Lane south of roundabout	23.9	1,682	41.62	1,766	41.62	2,076	41.18
Ferry Lane north of roundabout	23.9	1,682	41.62	1,766	41.62	2,076	41.18
Ferry Lane north of A13	23.9	7,257	3.11	7,618	3.11	7,722	3.59
Viking Way	19.2	3,853	4.41	4,045	4.41	4,079	4.70
Bridge Road	29.7	10,310	7.30	10,823	7.30	10,858	7.40
Broadway	35.1	3,381	14.05	3,549	14.05	3,584	14.29
Wennington Road	26	2,646	7.82	2,778	7.82	2,812	8.20
Upminster Road South	18.1	5,082	6.53	5,335	6.53	5,370	6.74
Upminster Road north	21.2	5,535	7.35	5,811	7.35	5,822	7.42
New Road east of Marsh Way	21.6	12,929	8.65	13,573	8.65	13,584	8.67
New Road west of Marsh Way	17.95	16,683	10.24	17,514	10.24	17,525	10.26
New Road east of Bridge Road	57.3	19,227	6.32	20,185	6.32	20,196	6.34
New Road south of Upminster Road North	40.2	14,286	8.81	14,997	8.81	15,009	8.84
Rainham Road	32.9	21,123	4.77	22,175	4.77	22,186	4.78
Marsh Way	37.6	17,340	4.12	18,204	4.12	18,255	4.22
A13 across Marsh Way roundabout	82.55	69,053	13.39	72,492	13.39	72,544	13.41
Marsh Way-A13 slip roads west	37.6	5,989	6.46	6,287	6.46	6,339	6.72
Marsh Way-A13 slip roads east	77.6	10,931	10.26	11,475	10.26	11,527	10.39
A13 east of Marsh Way roundabout	92.85	85,685	12.87	89,952	12.87	90,055	12.90
A13 across Ferry Lane	100.95	78,076	13.84	81,964	13.84	81,964	13.84
Ferry Lane-A13 slip roads west	85.4	6,741	3.35	7,077	3.35	7,180	3.86
Ferry Lane-A13 slip roads east	85.4	6,741	3.35	7,077	3.35	7,180	3.86
A13 east of Ferry Lane	100.35	78,072	14.34	81,960	14.34	82,063	14.37
Ferry Lane below A13	18.4	6,741	3.35	7,077	3.35	7,180	3.86
Ferry Lane/Coldharbour Lane roundabout	23.9	1682	41.62	1,766	41.62	2,076	41.18
Ferry Lane/A13 slip road southern roundabout	18.4	6741	3.35	7,077	3.35	7,387	4.84
Ferry Lane/A13 slip road northern roundabout	18.4	6741	3.35	7,077	3.35	7,283	4.36
Viking Way/Broadway roundabout	29.7	10310	7.30	10,823	7.30	10,927	7.60
Bridge Road/New Road roundabout	57.3	19227	6.32	20,185	6.32	20,219	6.38
Marsh Way/A13 roundabout	37.6	17340	4.12	18,204	4.12	18,255	4.22

5.2 BACKGROUND CONCENTRATIONS

The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail emissions within the vicinity of the study site. Several sources have been used to obtain representative background levels as discussed below.

The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and Technical Guidance (TG) (16).

The IAQM Guidance states:

> "*A matter of judgement should take into account the background and future background air quality and whether it is likely to approach or exceed the value of the AQO.*"

Additionally, TG (16) states:

> "*Typically, only the process contributions from local sources are represented within an output by the dispersion model. In these circumstances, it is necessary to add an appropriate background concentration(s) to the modelled source contributions to derive the total pollutant concentrations.*"

Defra Published Background Concentrations for 2019

The background concentrations shown in **Table 5-2** were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the application site. In August 2020, Defra issued revised 2018 based background maps for nitrogen oxide (NO_X), NO_2, PM_{10} and $PM_{2.5}$.

Table 5-2. Published Background Air Quality Levels (µg/m^3)

Receptor Location		2019			
		NO_X	NO_2	PM_{10}	$PM_{2.5}$
Proposed Site					
X Coordinate	Y Coordinate	28.37	19.49	15.60	10.67
Local Authority Monitoring					
HAV46		28.48	19.73	16.92	11.43
HAV50		31.27	21.27	17.05	11.50
HAV56		28.48	19.73	16.92	11.43
HV1		25.58	18.01	16.74	11.10
Existing Sensitive Receptors					
D1		30.73	21.09	17.92	11.80
D2		30.73	21.09	17.92	11.80
D3		30.73	21.09	17.92	11.80
D4		30.73	21.09	17.92	11.80
D5		28.48	19.73	16.92	11.43
D6		31.27	21.27	17.05	11.50
D7		31.27	21.27	17.05	11.50
D8		38.33	25.23	18.08	12.11
D9		29.83	20.44	17.28	11.76
D20		28.37	19.49	15.60	10.67
D21		28.37	19.49	15.60	10.67
D22		28.37	19.49	15.60	10.67
D23		28.37	19.49	15.60	10.67
D24		33.75	22.67	17.65	11.74
D25		28.37	19.49	15.60	10.67
D26		33.75	22.67	17.65	11.74
D27		28.37	19.49	15.60	10.67
D30		30.73	21.09	17.92	11.80

D31	28.48	19.73	16.92	11.43
D32	28.48	19.73	16.92	11.43
D33	28.48	19.73	16.92	11.43
D34	28.48	19.73	16.92	11.43
D35	28.48	19.73	16.92	11.43
D36	28.48	19.73	16.92	11.43
D37	25.58	18.01	16.74	11.10
D38	25.58	18.01	16.74	11.10
Ecological Sensitive Receptors				
D27	28.37	19.49	15.60	10.67
D28	28.37	19.49	15.60	10.67
D29	28.37	19.49	15.60	10.67
D39	33.75	22.67	17.65	11.74
D40	33.75	22.67	17.65	11.74
D41	33.75	22.67	17.65	11.74
D42	33.75	22.67	17.65	11.74
D43	30.73	21.09	17.92	11.80
D44	28.48	19.73	16.92	11.43
D45	28.48	19.73	16.92	11.43
D46	28.48	19.73	16.92	11.43
D47	28.48	19.73	16.92	11.43
D48	28.48	19.73	16.92	11.43

All the Defra background concentrations detailed in **Table 5-2** for 2019, show that the background levels are predicted to be below the relevant AQO within the study area.

A breakdown of the background source apportionment of NO_X concentrations at each monitoring location and receptor is shown in **Table 5-3**.

Table 5-3. Pollutant Source Apportionment of NO_X (µg/m^3)

Receptor Location	2019						
	Total NO_x	% of NO_x from Road Sources	% of NO_x from Industrial Sources	% of NO_x from Domestic Sources	% of NO_x from Aircraft Sources	% of NO_x from Rail Sources	% of NO_x from Other Sources
Local Authority Monitoring							
HAV46	28.48	35.95	5.20	9.11	0.15	0.06	49.54
HAV50	31.27	34.63	5.05	7.94	0.16	0.07	52.15
HAV56	28.48	35.95	5.20	9.11	0.15	0.06	49.54
HV1	25.58	33.30	5.06	8.90	0.14	0.05	52.56
Existing Sensitive Receptors							
D1	30.73	37.55	12.92	12.06	0.00	0.54	36.93
D2	30.73	37.55	12.92	12.06	0.00	0.54	36.93
D3	30.73	35.45	8.81	13.31	0.00	0.62	41.81
D4	30.73	32.68	8.62	11.86	0.00	0.62	46.22
D5	28.48	32.68	8.62	11.86	0.00	0.62	46.22
D6	31.27	32.68	8.62	11.86	0.00	0.62	46.22
D7	31.27	32.68	8.62	11.86	0.00	0.62	46.22

D8	38.33	32.68	8.62	11.86	0.00	0.62	46.22
D9	29.83	34.15	8.58	12.39	0.00	0.73	44.16
D20	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D21	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D22	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D23	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D24	33.75	37.35	7.49	6.09	0.13	0.05	48.88
D25	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D26	33.75	37.35	7.49	6.09	0.13	0.05	48.88
D27	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D30	30.73	41.40	4.79	6.81	0.12	0.05	46.82
D31	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D32	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D33	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D34	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D35	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D36	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D37	25.58	33.30	5.06	8.90	0.14	0.05	52.56
D38	25.58	33.30	5.06	8.90	0.14	0.05	52.56
Ecological Sensitive Receptors							
D27	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D28	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D29	28.37	24.20	5.60	7.33	0.14	0.06	62.68
D39	33.75	37.35	7.49	6.09	0.13	0.05	48.88
D40	33.75	37.35	7.49	6.09	0.13	0.05	48.88
D41	33.75	37.35	7.49	6.09	0.13	0.05	48.88
D42	33.75	37.35	7.49	6.09	0.13	0.05	48.88
D43	30.73	41.40	4.79	6.81	0.12	0.05	46.82
D44	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D45	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D46	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D47	28.48	35.95	5.20	9.11	0.15	0.06	49.54
D48	28.48	35.95	5.20	9.11	0.15	0.06	49.54

Table 5-3 shows that the major background source of NO_X at the monitoring, sensitive receptor locations where sources have been identified are mainly comprised of road and other sources.

A review of the Defra background site has determined that they are in line with the Local Authority monitoring within LBoH.

Table 5-4 shows the background concentrations utilised within the assessment.

Table 5-4. Utilised Background Concentrations (µg/m^3)

Receptor Location	2019		Source
	NO_x	NO_2	
Local Authority Monitoring			
HAV46	28.48	19.73	Defra Background Maps
HAV50	31.27	21.27	

HAV56	28.48	19.73	
HV1	25.58	18.01	
Existing Sensitive Receptors			
D1	30.73	21.09	Defra Background Maps
D2	30.73	21.09	
D3	30.73	21.09	
D4	30.73	21.09	
D5	28.48	19.73	
D6	31.27	21.27	
D7	31.27	21.27	
D8	38.33	25.23	
D9	29.83	20.44	
D20	28.37	19.49	
D21	28.37	19.49	
D22	28.37	19.49	
D23	28.37	19.49	
D24	33.75	22.67	
D25	28.37	19.49	
D26	33.75	22.67	
D27	28.37	19.49	
D30	30.73	21.09	
D31	28.48	19.73	
D32	28.48	19.73	
D33	28.48	19.73	
D34	28.48	19.73	
D35	28.48	19.73	
D36	28.48	19.73	
D37	25.58	18.01	
D38	25.58	18.01	
Ecological Sensitive Receptors			
D27	29.02	-	APIS
D28	29.02	-	
D29	29.02	-	
D39	34.18	-	
D40	34.18	-	
D41	34.18	-	
D42	34.18	-	
D43	30.84	-	
D44	28.79	-	
D45	28.79	-	
D46	28.79	-	
D47	28.79	-	
D48	28.79	-	

5.3 MODEL VERIFICATION

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification process is in general accordance with that contained in Section 7 of the TG(16) guidance note and uses the most recently

available diffusion tube monitoring data to best represent this. When using modelling techniques to predict concentrations, it is necessary to make a comparison between the modelling results and available roadside monitoring data, to ensure that the model is reproducing actual observations. Where systematic bias is evident in the base year verification, the modelled results are factored to better match the monitoring data and reduce the overall uncertainty in the model predictions. TG(16) (Section 'Model Validation, Verification, Adjustment and Uncertainty', Paragraphs 7.509-7.546) was observed.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_X at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_X emissions. These are converted into predicted roadside contribution NO_2 exposure at the relevant receptor locations based on the updated approach to deriving NO_2 from NO_X for road traffic sources published in Local Air Quality Management TG(16). The calculation was derived using the NO_X to NO_2 worksheet in the online LAQM tools website hosted by Defra. **Table 5-5** summarises the final model/monitored data correlation following the application of the model correction factor.

Table 5-5. Comparison of Roadside Modelling & Monitoring Results for NO_2

Monitoring Site	NO_2 µg/m^3		
	Monitored NO_2	**Modelled NO_2**	**Difference (%)**
HAV46	30.00	30.81	2.69%
HAV50	36.60	38.59	5.43%
HAV56	37.80	32.54	-13.93%
HV1	29.10	30.96	6.39%

The final model produced data at the monitoring locations to within 10% of the monitoring results at the majority of the verification points, as recommended by TG(16) guidance.

Diffusion tube HAV56 is the closest monitoring location to the proposed development, located 1.6 km to the north-east. It is also the monitoring site that recorded the highest concentration of NO_2 of 37.80 µg/m^3 during 2019. However, diffusion tube HAV56 is located along the access to Tesco Rainham, situated on Viking Way. No traffic data is available for Viking Way as part of the LAEI 2019 dataset or through the Department for Transport Road Traffic Statistics Website. As a result, AADT values for Viking Way have been inferred using previous professional experience and through a comparison of the local road network. The monitoring results at diffusion tube HAV56 are likely to be impacted by large volumes of daily commercial traffic along Viking Way. In comparison, the proposed development is situated along Ferry Lane in an industrial estate. The AADT along Ferry Lane is therefore significantly lower than along Viking Way and is comprised of a significantly higher proportion of HGVs arriving and departing from the industrial developments. Diffusion tube HAV56 is therefore likely to be the LPA monitoring location that is least representative of the development site. LAEI 2019 traffic data is available for the roads that HAV46, HAV50 and HV1 are situated along, and these monitoring locations are verified with modelling data within 10% over the monitored data.

Automatic monitoring is undertaken at location HV1, which is considered to be more accurate when compared to diffusion tube monitoring as air quality pollutants are recorded at a higher resolution. As a result, additional

focus has been given to this monitoring location during the verification process. The modelled data at monitoring location HV1 is overpredicting in the ADMS Roads model verification and modelled to be within 10% of the recorded monitoring result as recommended by TG16.

Monitoring locations and inlet heights for diffusion tubes HAV46, HAV50, HAV56 and automatic monitoring site HV1 were revisited after a first iteration preparing a model verification with the exact coordinates and inlet heights provided by the LAQM report. The results showed that diffusion tube HAV46 was overpredicting by 0.38%, diffusion tube HAV50 was overpredicting by 6.88%, diffusion tube HAV56 underpredicting by -19.46% and automatic monitoring location HV1 was overpredicting by 8.31%. The primary adjustment factor was calculated to be 2.78.

For the second iteration of the verification, the locations and inlet heights of the monitoring locations were slightly adjusted following a close review of the tube positions. HAV46, the original coordinates of which were 552441,182337 was moved slightly to 552436,182335, whilst diffusion tube HAV56 (552047,182357) was moved to 552037,182362 and automatic monitoring location HV1 (553127,182506) was slightly moved to 553119,182509. Additionally, the inlet height of automatic monitoring location HV1 was slightly adjusted from 3.0 m to 3.2 m. After running model verification for the second time, diffusion tube HAV46 overpredicted by 2.69%, diffusion tube HAV50 overpredicted by 5.43%, diffusion tube HAV56 underpredicted by -13.93% and automatic monitoring location HV1 overpredicted by 6.39%. The primary adjustment factor was calculated to be 3.64.

The final verification model correlation coefficient (representing the model uncertainty) is 1.00. This was achieved by applying a model correction factor of 3.64 to roadside predicted NO_X concentrations before converting to NO_2. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

It should be noted that TG (16) states that in the absence of any particulate matter (PM_{10} and $PM_{2.5}$) monitoring data for verification, it may be appropriate to apply the NO_X-NO_2 adjustment factor to the modelled particulate matter.

TG(16) also states that care needs to be taken when applying model adjustment based on one monitoring site only as the adjustment may not be representative of other locations.

As there is no suitable PM_{10} or $PM_{2.5}$ monitoring data within the study area, it is not possible to perform a model verification for these pollutants. As such, the NO_2 adjustment factor has also been applied to the PM_{10} and $PM_{2.5}$ modelled results, in accordance with LAQM.TG(16).

5.4 ADMS-ROADS MODEL INPUTS

Table 5-6. Summary of ADMS Roads Model Inputs

Parameter	Description	Input Value
Chemistry	A facility within ADMS-Roads to calculate the chemical reactions in the atmosphere between Nitric Oxide (NO), NO_2, Ozone (O_3) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	**London City 2019 Meteorological Station**, hourly sequential data

Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	**1.0m** representing a typical surface roughness for **Cities, Woodlands** was used for the Site **1.5m** representing a typical surface roughness for **Large Urban Areas** for the met. Measurement site.
Latitude	Allows the location of the model area to be set	United Kingdom = **51.51**
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Mixed Urban/Industrial = **30m** was used for the Site Large Conurbations = 1**00m** was used for the met. Measurement site.
Elevation of Road	Allows the height of the road link above ground level to be specified.	Overpasses along the A13 were set to **5m** and **10m** following a review. All other road links were set at ground level = **0m**.
Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	No time varied emissions used
Road Type	Allows the effect of different types of roads to be assessed.	**Urban (Not London)** settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Derived from the London Atmospheric Emissions Inventory
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a 'street canyon'.	No canyons used within the model
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the in-built EFT database of traffic emission factors.	The **EFT** Version **11.0 (2021)** dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	**2019** data for verification and baseline Operational Phase Assessment. **2023** data for the Operational Phase Traffic Assessment.

5.5 ADMS MODELLING RESULTS

5.5.1 Traffic Assessment

The ADMS Model has predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at relevant receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

5.5.2 Assessment Scenarios

For the operational year of 2023, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emissions Factor Toolkit (EFT) 2023 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors:

- 2019 Baseline = Existing Baseline conditions;
- 2023 'Do Minimum' = 2023 Baseline + Committed Development Flows (through local growth factor); and,
- 2023 'Do Something' = 2023 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows.

5.5.3 Long-Term Operational Traffic Assessment

Nitrogen Dioxide

Table 5-7 presents a summary of the predicted change in NO_2 concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 5-7. Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m^3)			
		2019 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
D1	8 Manstead Gardens Rainham (residential)	24.96	23.53	23.53	<0.01
D2	6 River Close Rainham (residential)	24.29	23.11	23.12	0.01
D3	56 Elizabeth Road (residential)	23.71	22.75	22.76	0.01
D4	15 Palliser Drive Rainham (residential)	23.51	22.65	22.66	0.01
D5	21 Broadway, Rainham (residential)	24.43	22.91	22.94	0.03
D6	Flat 49 Dunedin Road (residential)	26.76	24.73	24.74	0.01
D7	2a Phillip Road (residential)	25.84	24.14	24.15	0.01
D8	107 New Road (residential)	31.74	29.35	29.36	0.01
D9	162 Oval Road South Dagenham	20.78	20.65	20.65	<0.01
D20	H Smith Food Group	20.35	20.01	20.03	0.02
D21	Quantum Group	20.49	20.08	20.11	0.03
D22	The EA MMF10 a	20.81	20.19	20.28	0.09
D23	Thermit Welding on Ferry Lane	20.86	20.25	20.32	0.07
D24	TotalFood Distribution Ltd	25.26	24.10	24.23	0.13
D25	Shanks Municipal waste Management	20.82	20.14	20.27	0.13
D26	Footpath	24.24	23.61	23.65	0.04
D27	River Thames	20.32	19.96	20.00	0.04
D30	Harris Academy Rainham	25.67	24.29	24.31	0.02
D31	Rainham Village Primary School and Nursery	27.30	24.68	24.73	0.05
D32	New Beginnings Day Nursery	27.03	24.91	24.95	0.04
D33	Health Centre, Upminster Road South	25.42	23.43	23.46	0.03
D34	Playways Pre-School	25.30	23.65	23.68	0.03
D35	Frankphil Childcare	26.77	24.69	24.73	0.04
D36	The Cottage Pre-School Nursery	27.43	25.10	25.15	0.05
D37	Glebe House (Residential)	26.93	23.98	23.99	0.01
D38	3714 New Road (Residential)	29.74	25.65	25.68	0.03
Annual Mean AQO		**40 µg/m^3**			

*Located in the AQMA

All modelled existing receptors are predicted to be below the AQO for NO_2 in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 5-7**, the maximum predicted increase in annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the proposed development is likely to be 0.13 µg/m^3 at The Cottage Pre-School Nursery (D24) and Glebe House (D25).

The predicted long-term NO_2 concentrations at all proposed and existing receptors are well below 60 µg/m^3 in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO_2 AQO at all modelled receptors as outlined in LAQM TG(16) technical guidance.

Figure 5-1, **Figure 5-2**, and **Figure 5-3** below, illustrate the Total Long Term Annual Average Nitrogen Dioxide (NO_2) Contribution and Concentration at the Proposed Development (µg/m^3).

Figure 5-1. Annual Average Long-Term Nitrogen Dioxide (NO_2) Contribution from Proposed Development ($\mu g/m^3$)

Figure 5-2. Total Long Term Annual Average Nitrogen Dioxide (NO_2) Concentration at Proposed Development ($\mu g/m^3$)

Figure 5-3. Total Long Term Annual Average Nitrogen Dioxide (NO_2) Concentration Across the Study Area (µg/m^3)

It should be noted that the contour plots presented in **Figure 5-1**, **Figure 5-2** and **Figure 5-3** are calculated at the height of 1.5 m. Some sections of the road network are modelled above ground-level, e.g. the raised overpasses of the A13 that cross Ferry Lane and Marsh Way, which are modelled at 5 m height. This accounts for the lower concentrations of NO_2 modelled along these sections of the A13 in **Figure 5-3** as the emissions are produced above the level of the model.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3.0. The outcomes of the assessment are summarised in **Table 5-8**.

Table 5-8. Impact Description of Effects at Key Receptors (NO_2)

Impact Description of NO_2 Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
D1	<0.01	0.00	0%	≤75% of AQO	Negligible
D2	0.01	0.03	0%	≤75% of AQO	Negligible
D3	0.01	0.03	0%	≤75% of AQO	Negligible
D4	0.01	0.03	0%	≤75% of AQO	Negligible
D5	0.03	0.08	0%	≤75% of AQO	Negligible
D6	0.01	0.02	0%	≤75% of AQO	Negligible
D7	0.01	0.02	0%	≤75% of AQO	Negligible
D8	0.01	0.02	0%	≤75% of AQO	Negligible
D9	<0.01	0.00	0%	≤75% of AQO	Negligible
D20	0.02	0.05	0%	≤75% of AQO	Negligible
D21	0.03	0.08	0%	≤75% of AQO	Negligible
D22	0.09	0.23	0%	≤75% of AQO	Negligible
D23	0.07	0.18	0%	≤75% of AQO	Negligible
D24	0.13	0.32	0%	≤75% of AQO	Negligible
D25	0.13	0.32	0%	≤75% of AQO	Negligible
D26	0.04	0.10	0%	≤75% of AQO	Negligible
D27	0.04	0.10	0%	≤75% of AQO	Negligible
D30	0.02	0.05	0%	≤75% of AQO	Negligible
D31	0.05	0.13	0%	≤75% of AQO	Negligible
D32	0.04	0.10	0%	≤75% of AQO	Negligible
D33	0.03	0.08	0%	≤75% of AQO	Negligible
D34	0.03	0.08	0%	≤75% of AQO	Negligible
D35	0.04	0.10	0%	≤75% of AQO	Negligible
D36	0.05	0.12	0%	≤75% of AQO	Negligible
D37	0.01	0.02	0%	≤75% of AQO	Negligible
D38	0.03	0.08	0%	≤75% of AQO	Negligible
+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in Section 3.0. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM_{10})

Table 5-9 presents a summary of the predicted change in annual mean PM_{10} concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 5-9. Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m³)			
		2019 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
D1	8 Manstead Gardens Rainham (residential)	18.80	18.77	18.77	<0.01
D2	6 River Close Rainham (residential)	18.63	18.61	18.62	0.01
D3	56 Elizabeth Road (residential)	18.49	18.47	18.47	<0.01
D4	15 Palliser Drive Rainham (residential)	18.42	18.40	18.40	<0.01
D5	21 Broadway, Rainham (residential)	17.78	17.75	17.76	0.01
D6	Flat 49 Dunedin Road (residential)	17.93	17.90	17.90	<0.01
D7	2a Phillip Road (residential)	17.79	17.77	17.77	<0.01
D8	107 New Road (residential)	19.14	19.10	19.10	<0.01
D9	162 Oval Road South Dagenham	17.35	17.35	17.35	<0.01
D20	H Smith Food Group	15.78	15.77	15.77	<0.01
D21	Quantum Group	15.80	15.79	15.80	0.01
D22	The EA MMF10 a	15.84	15.83	15.84	0.01
D23	Thermit Welding on Ferry Lane	15.86	15.85	15.85	<0.01
D24	TotalFood Distribution Ltd	18.09	18.08	18.10	0.02
D25	Shanks Municipal waste Management	15.83	15.81	15.82	0.01
D26	Footpath	17.98	17.97	17.97	<0.01
D27	River Thames	15.76	15.75	15.76	0.01
D30	Harris Academy Rainham	18.80	18.77	18.78	0.01
D31	Rainham Village Primary School and Nursery	18.10	18.05	18.06	0.01
D32	New Beginnings Day Nursery	18.27	18.23	18.24	0.01
D33	Health Centre, Upminster Road South	17.82	17.79	17.80	0.01
D34	Playways Pre-School	17.96	17.93	17.93	<0.01
D35	Frankphil Childcare	18.16	18.12	18.13	0.01
D36	The Cottage Pre-School Nursery	18.25	18.20	18.21	0.01
D37	Glebe House (Residential)	18.65	18.62	18.62	<0.01
D38	3714 New Road (Residential)	18.57	18.51	18.51	<0.01
Annual Mean AQO		**40 µg/m³**			

*Located in the AQMA

All modelled existing receptors are predicted to be below the AQO for PM_{10} in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 5-9**, the maximum predicted increase in annual average exposure to PM_{10} at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.02 µg/m³ at The Cottage Pre-School Nursery (D24).

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3.0. The outcomes of the assessment are summarised in **Table 5-10**.

Table 5-10. Impact Description of Effects at Key Receptors (PM_{10})

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
D1	<0.01	0.00	0%	≤75% of AQO	Negligible
D2	0.01	0.03	0%	≤75% of AQO	Negligible
D3	<0.01	0.00	0%	≤75% of AQO	Negligible
D4	<0.01	0.00	0%	≤75% of AQO	Negligible
D5	0.01	0.03	0%	≤75% of AQO	Negligible
D6	<0.01	0.00	0%	≤75% of AQO	Negligible
D7	<0.01	0.00	0%	≤75% of AQO	Negligible
D8	<0.01	0.00	0%	≤75% of AQO	Negligible
D9	<0.01	0.00	0%	≤75% of AQO	Negligible
D20	<0.01	0.00	0%	≤75% of AQO	Negligible
D21	0.01	0.03	0%	≤75% of AQO	Negligible
D22	0.01	0.02	0%	≤75% of AQO	Negligible
D23	<0.01	0.00	0%	≤75% of AQO	Negligible
D24	0.02	0.05	0%	≤75% of AQO	Negligible
D25	0.01	0.02	0%	≤75% of AQO	Negligible
D26	<0.01	0.00	0%	≤75% of AQO	Negligible
D27	0.01	0.02	0%	≤75% of AQO	Negligible
D30	0.01	0.03	0%	≤75% of AQO	Negligible
D31	0.01	0.02	0%	≤75% of AQO	Negligible
D32	0.01	0.02	0%	≤75% of AQO	Negligible
D33	0.01	0.03	0%	≤75% of AQO	Negligible
D34	<0.01	0.00	0%	≤75% of AQO	Negligible
D35	0.01	0.02	0%	≤75% of AQO	Negligible
D36	0.01	0.03	0%	≤75% of AQO	Negligible
D37	<0.01	0.00	0%	≤75% of AQO	Negligible
D38	<0.01	0.00	0%	≤75% of AQO	Negligible
+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located in the AQMA					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in Section 3.0. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter ($PM_{2.5}$)

Table 5-11 presents a summary of the predicted change in annual mean $PM_{2.5}$ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 5-11. Predicted Annual Average Concentrations of $PM_{2.5}$ at Receptor Locations

Receptor		$PM_{2.5}$ (µg/m³)			
		2019 Baseline	2023 Do Minimum	2023 Do Something	Development Contribution
D1	8 Manstead Gardens Rainham (residential)	12.32	12.28	12.28	<0.01
D2	6 River Close Rainham (residential)	12.23	12.19	12.19	<0.01
D3	56 Elizabeth Road (residential)	12.14	12.11	12.11	<0.01
D4	15 Palliser Drive Rainham (residential)	12.10	12.07	12.07	<0.01
D5	21 Broadway, Rainham (residential)	11.95	11.90	11.91	0.01
D6	Flat 49 Dunedin Road (residential)	12.04	11.99	11.99	<0.01
D7	2a Phillip Road (residential)	11.96	11.92	11.92	<0.01
D8	107 New Road (residential)	12.75	12.70	12.70	<0.01
D9	162 Oval Road South Dagenham	11.80	11.80	11.80	<0.01
D20	H Smith Food Group	10.77	10.76	10.76	<0.01
D21	Quantum Group	10.79	10.78	10.78	<0.01
D22	The EA MMF10 [a]	10.81	10.80	10.80	<0.01
D23	Thermit Welding on Ferry Lane	10.82	10.81	10.81	<0.01
D24	TotalFood Distribution Ltd	12.01	11.98	11.99	0.01
D25	Shanks Municipal waste Management	10.81	10.78	10.79	0.01
D26	Footpath	11.94	11.92	11.92	<0.01
D27	River Thames	10.76	10.75	10.76	0.01
D30	Harris Academy Rainham	12.33	12.29	12.29	<0.01
D31	Rainham Village Primary School and Nursery	12.15	12.08	12.09	0.01
D32	New Beginnings Day Nursery	12.25	12.18	12.19	0.01
D33	Health Centre, Upminster Road South	11.98	11.93	11.93	<0.01
D34	Playways Pre-School	12.06	12.01	12.01	<0.01
D35	Frankphil Childcare	12.19	12.12	12.13	0.01
D36	The Cottage Pre-School Nursery	12.24	12.17	12.18	0.01
D37	Glebe House (Residential)	12.24	12.16	12.17	0.01
D38	3714 New Road (Residential)	12.22	12.12	12.13	0.01
Annual Mean AQO		**20 µg/m³**			

*Located in the AQMA

All modelled existing receptors are predicted to be below the AQO for $PM_{2.5}$ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 5-11**, the maximum predicted increase in annual average exposure to $PM_{2.5}$ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.01 µg/m³ at 21 Broadway, Rainham (D5), The Cottage Pre-School Nursery (D24), Glebe House (D26), 8 Manstead Gardens Rainham (D27), 56 Elizabeth Road (D31), 15 Palliser Drive Rainham (D32), 2a Phillip Road (D35), 107 New Road (D36), 162 Oval Road South Dagenham (D37) and H Smith Food Group (D38).

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean $PM_{2.5}$ exposure has been assessed with reference to the criteria in Section 3.0. The outcomes of the assessment are summarised in **Table 5-12**.

Table 5-12. Impact Description of Effects at Key Receptors ($PM_{2.5}$)

Impact Description of $PM_{2.5}$ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
D1	<0.01	0.00	0%	≤75% of AQO	Negligible
D2	<0.01	0.00	0%	≤75% of AQO	Negligible
D3	<0.01	0.00	0%	≤75% of AQO	Negligible
D4	<0.01	0.00	0%	≤75% of AQO	Negligible
D5	0.01	0.05	0%	≤75% of AQO	Negligible
D6	<0.01	0.00	0%	≤75% of AQO	Negligible
D7	<0.01	0.00	0%	≤75% of AQO	Negligible
D8	<0.01	0.00	0%	≤75% of AQO	Negligible
D9	<0.01	0.00	0%	≤75% of AQO	Negligible
D20	<0.01	0.00	0%	≤75% of AQO	Negligible
D21	<0.01	0.00	0%	≤75% of AQO	Negligible
D22	<0.01	0.00	0%	≤75% of AQO	Negligible
D23	<0.01	0.00	0%	≤75% of AQO	Negligible
D24	0.01	0.05	0%	≤75% of AQO	Negligible
D25	0.01	0.05	0%	≤75% of AQO	Negligible
D26	<0.01	0.00	0%	≤75% of AQO	Negligible
D27	0.01	0.05	0%	≤75% of AQO	Negligible
D30	0.06	0.25	0%	≤75% of AQO	Negligible
D31	<0.01	0.02	0%	≤75% of AQO	Negligible
D32	<0.01	0.00	0%	≤75% of AQO	Negligible
D33	0.01	0.05	0%	≤75% of AQO	Negligible
D34	0.01	0.05	0%	≤75% of AQO	Negligible
D35	<0.01	0.00	0%	≤75% of AQO	Negligible
D36	<0.01	0.00	0%	≤75% of AQO	Negligible
D37	0.01	0.05	0%	≤75% of AQO	Negligible
D38	0.01	0.05	0%	≤75% of AQO	Negligible
+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in Section 3.0. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

5.5.4 Ecological Sensitive Receptor Locations

Background concentrations at each of the ecologically sensitive sites were determined through a review of the NO_X pollutants published on the APIS website.

The below assessment has been undertaken in accordance with A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites (IAQM, 2020).

Nitrogen Oxide

Table 5-13 presents a summary of the predicted change in NO_X concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'Do Minimum' and 'Do

Something' scenarios.

Table 5-13. Predicted Annual Average Concentrations of NO_X at Ecological Receptor Locations

Ecological Receptor		Predicted Maximum Annual Mean Concentration (µg/m³)				
		Do Minimum 2023 NO_X	Do Something 2023 NO_X	Process Contribution (PC)	PC as %age of AQO	Background
D27	River Thames SINC/ Tidal Tributaries SINC	29.96	30.03	0.07	0.22	29.02
D39	Inner Thames Marshes	44.08	45.25	1.17	3.92	34.18
D40	Inner Thames Marshes	55.09	55.42	0.32	1.08	34.18
D41	Inner Thames Marshes	55.11	55.55	0.44	1.45	34.18
D42	Inner Thames Marshes	45.25	45.49	0.24	0.79	34.18
D43	Inner Thames Marshes	34.78	34.83	0.05	0.16	30.84
D44	Ingrebourne Marshes	51.38	51.48	0.10	0.34	28.79
D45	Ingrebourne Marshes	55.99	56.05	0.06	0.21	28.79
D46	Ingrebourne Marshes	34.02	34.03	0.02	0.06	28.79
D47	Ingrebourne Marshes	49.39	49.43	0.04	0.12	28.79
D48	Ingrebourne Marshes	43.59	43.61	0.03	0.09	28.79
Annual Mean AQO/Critical Level (CL)		**30 µg/m³**				

As indicated in **Table 5-13**, the maximum predicted increase in the annual average exposure to NO_X at any ecological receptor, due to changes in traffic movements associated with the development, is 1.17 µg/m³ at Inner Thames Marshes (SSSI) (D39).

Section 5.5.4.1 of *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2020 states:

> *"Where the assessment indicates that changes in annual mean NO_x concentrations within a designated site cannot be dismissed as imperceptible (i.e. an increase of over 0.4 µg/m³) and the NO_x critical level is exceeded, then changes in nutrient nitrogen deposition should be calculated as supporting information to further assist in the evaluation of significance."*

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 1.17 µg/m³ at Inner Thames Marshes (SSSI) (D39). Additionally, the increase in the annual average exposure to NO_x is 0.44 at Inner Thames Marshes (D41). These are above the 0.40 µg/m³ development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2020.

As the NOx contribution at Inner Thames Marshes (D39 and D41) is above 0.4 µg/m³, a full nitrogen deposition assessment has been undertaken below.

5.5.5 Nitrogen Deposition

The dry deposition calculation has used the spreadsheet provided by the Air Quality Modelling and Assessment Unit (AQMAU). These calculations take the predicted maximum annual concentration (µg/m³) and use an assumed deposition velocity to estimate deposition concentration in kgN/ha/year or keq/ha/year. The available deposition velocity is 0.14 for grasslands or similar habitats, in accordance with in LA 105 (published November

2019). The calculated total nitrogen depositions at the ecological receptors are presented in **Table 5-14**. The calculated nitrogen deposition was compared to the available critical load of nitrogen deposition.

Table 5-14. The Predicted Total PC Nitrogen Deposition

Ecological Receptor	Long-Term PC of NO_x ($\mu g/m^3$)	Dry PC Nitrogen Deposition (kgN/ha/year)	Background	Total PC Nitrogen Deposition (kgN/ha/year)	Critical load (CL) (kgN/ha/year)	PC as %age of CL
D39	1.17	0.16	29.96	30.12	10 - 20	0.82 - 1.64
D41	0.44	0.06	29.96	30.02	10 - 20	0.3 - 0.61

In relation to air quality impacts on designated sites (most notably in relation to Nitrogen deposition), Natural England's advice regarding the screening threshold for a likely significant effect is summarised as follows.

> "*Where either the resulting deposition / concentration equates to 'less than 1% of the relevant benchmark', or the predicted Annual Average Daily Traffic (AADT) value is less than 1000, a likely significant effect can be screened out for the project when it is considered both alone and in combination with other plans or projects*."

Critical Load Function Tool

Calculating exceedance of an acidity critical load function, or the impact description of a contribution from a source is complex. Critical Load Function Tool has been used to calculate the exceedance (http://www.apis.ac.uk/critical-load-function-tool). It enables the comparison of acid deposition to the critical load function to help make a decision on the impact description of a process contribution.

Inner Thames Marsh (SSSI) (D39)

The results of exceedance and deposition as a proportion of the critical level (CL) function for D39, are presented both in **Figure 5-4** and in **Table 5-15**. The following data has been used in the calculations.

Background deposition: 2.31 (N: 2.14 |S: 0.25) (keg/ha/yr).

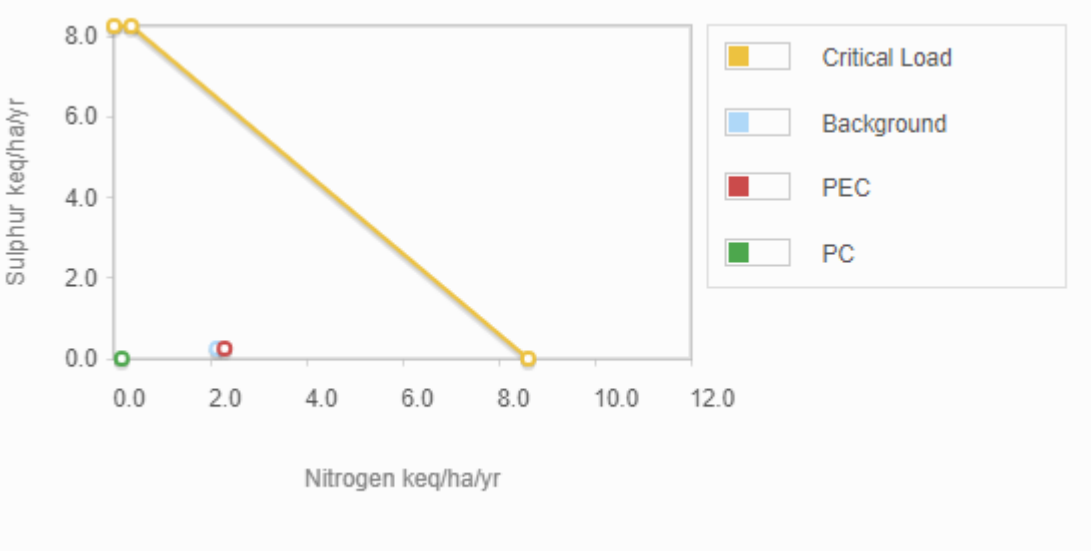
CLmax S: 8.263 CLminN: 0.357 CLMaxN: 8.62 (keq/ha/yr)

Nitrogen PC deposition: = 1.17*0.14 = 0.16 kqN/ha/yr

Table 5-15. Exceedance and deposition as a proportion of the CL Function at D39

Source	Exceedance (keq/ha/year)	% of CL function
Process Contribution (PC)	No exceedance of CL function	**1.9**
Background	No exceedance of CL function	**27.7**
Predicted Environmental Concentration (PEC)	No exceedance of CL function	**29.6**

Figure 5-4. Exceedance and deposition as a proportion of the CL Function at D39



The maximum predicted total acid deposition PC at receptor D39 is 0.16 keqN/ha/yr, which is 'no exceedance of CL function'. The model has been calculated based on a worst-case in which there is no development in the Do Minimum Scenario. In this worst-case scenario it can be concluded that the impact of nitrogen depositions from the road at D39 are negligible. The proposed development would see a net decrease in traffic (both cars and HGVs) arriving and departing from the site, which would result in a net improvement in nitrogen deposition at ecological receptors.

Inner Thames Marsh (SSSI) (D41)

The results of exceedance and deposition as a proportion of the critical level (CL) function for D41, are presented both in **Figure 5-5** and in **Table 5-16**. The following data has been used in the calculations.

Background deposition: 2.31 (N: 2.14 |S: 0.25) (keg/ha/yr).

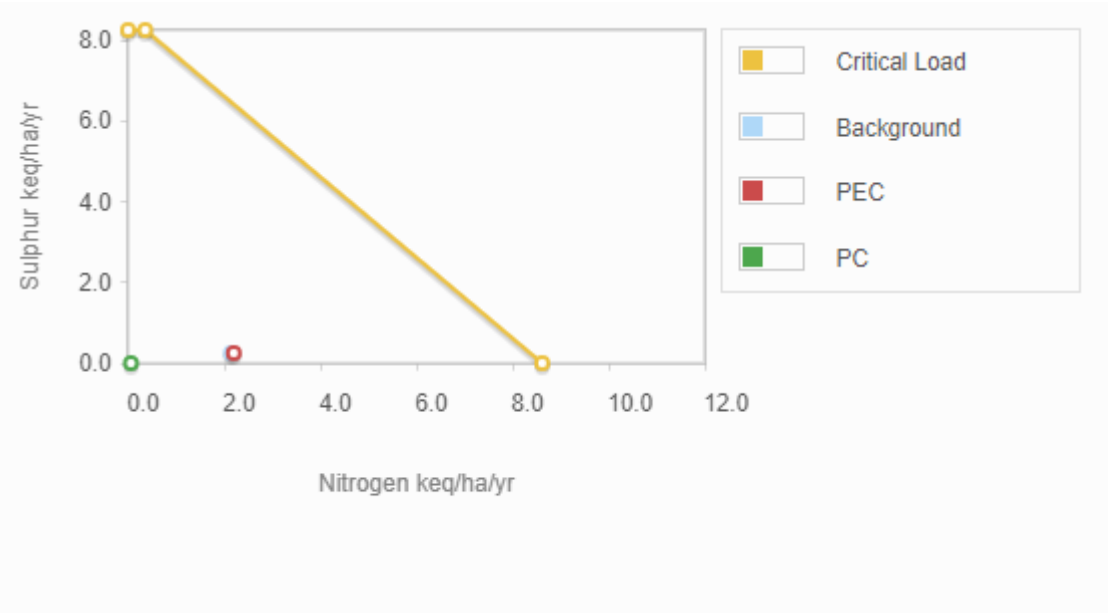
CLmax S: 8.263 CLminN: 0.357 CLMaxN: 8.62 (keq/ha/yr)

Nitrogen PC deposition: = 0.44*0.14 = 0.06 kqN/ha/yr

Table 5-16. Exceedance and deposition as a proportion of the CL Function at D41

Source	Exceedance (keq/ha/year)	% of CL function
Process Contribution (PC)	No exceedance of CL function	0.7
Background	No exceedance of CL function	27.7
Predicted Environmental Concentration (PEC)	No exceedance of CL function	28.4

Figure 5-5. Exceedance and deposition as a proportion of the CL Function at D41



The maximum predicted total acid deposition PC at receptor D41 is 0.06 keqN/ha/yr, which is 'no exceedance of CL function'. The model has been calculated based on a worst-case in which there is no development in the Do Minimum Scenario. In this worst-case scenario it can be concluded that the impact of nitrogen depositions from the road at D41 are negligible. The proposed development would see a net decrease in traffic (both cars and HGVs) arriving and departing from the site, which would result in a net improvement in nitrogen deposition at ecological receptors.

6.0 AIR QUALITY NEUTRAL

This Air Quality Neutral assessment considers the emissions of atmospheric pollutants from the development at source (i.e. from vehicles and building services plant) and compares the emissions with the benchmark levels that define neutrality.

The requirement for this Air Quality Neutral report is driven by:

- Policy SI 1 in the London Plan. The London Plan states: "[…] development proposals should be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality"; and
- The Mayor's Air Quality Strategy (MAQS). The MAQS includes a policy which states that "New developments in London shall as a minimum be 'air quality' neutral through the adoption of best practice in the management and mitigation of emissions."

The 'air quality neutral' policy is designed to address the problem of multiple new developments that individually add only a small increment to pollution at the point of human exposure (i.e. ambient concentrations), but cumulatively lead to baseline pollution levels creeping up. The policy requires Developers to design their schemes so that they are at least Air Quality Neutral in terms of emissions at source.

The Greater London Authority (GLA) has published a new draft guidance on Air Quality Neutral Assessments, which supports the London Plan (2021) which altered the approach taken as part of the GLA's Sustainable Design and Construction Supplementary Planning Guidance (SPG), published in April 2014, which provided a formal definition for the term 'air quality neutral' and allowed a transparent and consistent approach to demonstrating whether a development is 'air quality neutral'.

This Air Quality Neutral assessment determines whether the proposed development is air quality neutral using the GLA draft Air Quality Neutral Guidance (published November 2021) calculation method that separately quantifies building emissions (from heating and power plant) and transport emissions and introduces a 'damage cost' approach where a development is not determined to be Air Quality Neutral.

6.1 BENCHMARKS

6.1.1 Buildings Emissions Benchmark (BEB)

The GLA draft Air Quality Neutral Guidance report has defined a Building Emission Benchmarks (BEB) for NO_X for a series of land-use classes. The benchmarks are expressed in terms of g/m^2/annum. The gross internal area (GIA) is used to define the area.

The derived BEBs for NO_X Emissions are shown in **Table 6-1**.

Table 6-1. Building Emissions Benchmark NO_X Emission Rates (gNO_X/m^2/annum)

Land Use		Individual Gas Boilers	Gas Boiler Network	CHP + Gas Boiler Network	Heat Pumps + Gas Boiler Network
Residential	Class C (C3, C4)	3.5	5.7	7.8	5.7
Retail	Class E(a)	0.53	0.97	4.31	0.97
Restaurants and bars	Class E(b)	1.76	3.23	14.34	3.23

Offices	Class E(c)	1.43	2.62	11.68	2.62
Industrial	Class B2	1.07	1.95	8.73	1.95
Storage and distribution	Class B8	0.55	1.01	4.5	1.01
Hotel	Class C1	9.47	15.42	38.16	15.42
Care homes and hospitals	Class C2	9.15	14.9	36.86	14.9
Schools, nurseries, doctors' surgeries, other non-residential institutions	Class F1	0.9	1.66	7.39	1.66
Assembly and leisure	Class F2	2.62	4.84	21.53	4.84

Note 1: These benchmarks have been calibrated for London.

6.1.2 Transport Benchmark Trip Rates (TBTR)

The derived Transport Benchmark Trip Rates (TBTR) are shown in **Table 6-2**.

Table 6-2. Benchmark Trip Rates

Land use		Annual Trips Per	Benchmark Trip Rates		
			CAZ	Inner	Outer
Residential	Class C (C3, C4)	dwelling	68	114	447
Office / Light Industrial	Class E(c)	m2 (GIA)	2	1	16
Retail (Superstore)	Class E(a)	m2 (GIA)	39	73	216
Retail (Convenience)	Class E(a)	m2 (GIA)	18	139	274
Restaurant / Café	Class E(b)	m2 (GIA)	64	137	170
Drinking establishments	Class E(b)	m2 (GIA)	0.8	8	N/A
Hot food takeaway	Class E(b)	m2 (GIA)	N/A	32.4	590
Industrial	Class B2	m2 (GIA)	N/A	3.9	16.3
Storage and distribution	Class B8	m2 (GIA)	N/A	1.4	5.8
Hotels	Class C1	m2 (GIA)	1	1.4	6.9
Care homes and hospitals	Class C2	m2 (GIA)	N/A	1.1	19.5
Schools, nurseries, doctors' surgeries, other non- residential institutions	Class F1	m2 (GIA)	0.1	30.3	44.4
Assembly and leisure	Class F2	m2 (GIA)	3.6	10.5	47.2

6.2 AIR QUALITY NEUTRAL CALCULATION

Building Emissions

The proposed development is to regularise on-site activities. As a result, there are no building emissions associated with the proposed development.

Transport Trip Generation

The transport assessment provides a summary of daily 2-way trips generation by the proposed development:

Vehicle Trips

The Hurlstone Partnership have provided development trips associated with the development purpose of the Air Quality Neutral assessment of transport emissions. A worst-case assessment has been undertaken assuming all development trips are associated with the operational phase of the development. The proposed

development traffic has been assessed against a 'Do Minimum' scenario without the site as a worst-case.

Table 6-3. Benchmark Trip Rate Calculation

Land Use		Area	GIA of Proposed Site (m^2)	Benchmark Trip Rates	Total Benchmark Trip Rate (trips/year)
Industrial	Class B2	Outer	28,055	16.3	457,297
Total					**457,297**

Table 6-4. Development Trip Calculations

Land Use		Area	Traffic			
			Light Vehicles	HGVs	Total	Annual Trips
Industrial	Class B2	Outer	160	150	310	113,150
Total						**113,150**

The total annual transport rate of 113,150 may be compared with the total benchmarked trip rate of 457,297. The results indicate that the total annual transport rate in **Table 6-4** is below the benchmark criteria in **Table 6-3** and can therefore be considered air quality neutral.

6.3 SUMMARY OF AIR QUALITY NEUTRAL ASSESSMENT

The proposed development will not include installation of CHP or other heat source emissions for buildings. The development trip rate is below the transport emissions benchmark. As a result, the proposed development can be considered Air Quality Neutral.

7.0 MITIGATION

7.1 OPERATIONAL PHASE

All modelled receptors are predicted to be below the annual average AQO for NO_2, PM_{10} and $PM_{2.5}$, and the impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2, PM_{10} and $PM_{2.5}$ exposure, is determined to be 'negligible' at all existing receptors. Therefore, no further mitigation is required.

8.0 CONCLUSIONS

This report presents the findings of an air quality assessment undertaken to assess road traffic emission impacts in support of a planning application to regularize the existing operation on the site of Frog Island, Ferry Lane South, Rainham, RM13 9DB.

Operational Assessment

The 2023 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor is likely to be 0.13 µg/m^3 at The Cottage Pre-School Nursery (D24) and Glebe House (D25).

For PM_{10}, the maximum predicted increase in the annual average exposure is likely to be 0.02 µg/m^3 at The Cottage Pre-School Nursery (D24). For $PM_{2.5}$, the maximum predicted increase in the annual average exposure is likely to be 0.01 µg/m^3 at 21 Broadway, Rainham (D5), The Cottage Pre-School Nursery (D24), Glebe House (D26), 8 Manstead Gardens Rainham (D27), 56 Elizabeth Road (D31), 15 Palliser Drive Rainham (D32), 2a Phillip Road (D35), 107 New Road (D36), 162 Oval Road South Dagenham (D37) and H Smith Food Group (D38).

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2, PM_{10} and $PM_{2.5}$ exposure, is determined to be 'negligible' at all existing receptors.

The proposed development will not include installation of CHP or other heat source emissions for buildings. The development trip rate is below the transport emissions benchmark. As a result, the proposed development can be considered Air Quality Neutral.

Operational Assessment – Ecology

The maximum predicted increase in the annual average exposure to NO_X at the identified ecological receptor, due to changes in traffic movements associated with the development, is 1.17 µg/m^3 at Inner Thames Marshes (SSSI) (D39) which is above the 0.40 µg/m^3 development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2020.

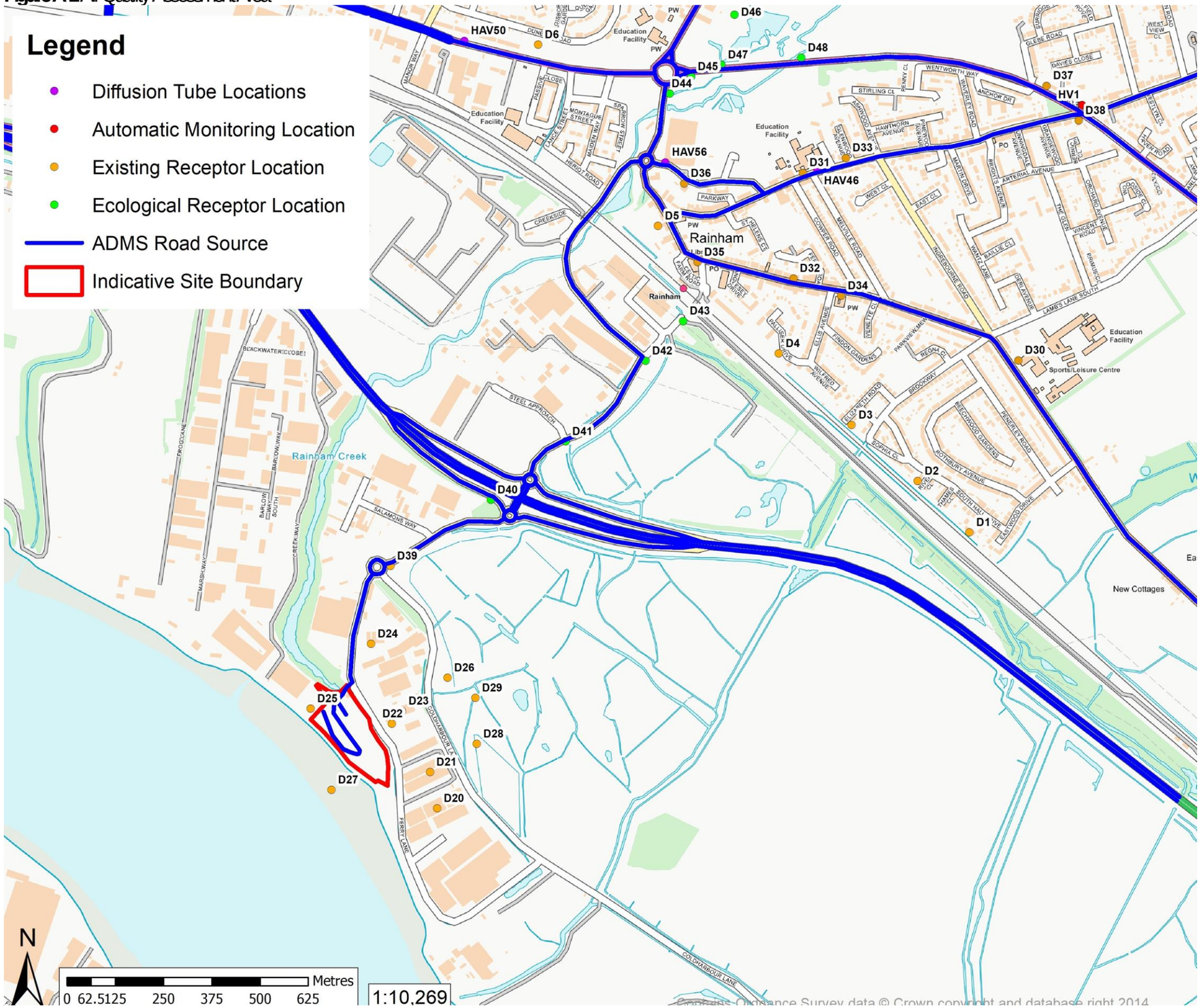
A full nitrogen deposition assessment was undertaken for ecological receptors D39 and D41 due to a development NO_x contribution of >0.40 µg/m^3. There were no predicted significant impacts on nitrogen deposition at receptors D39 and D41 as a result of the proposed development.

Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

In conclusion, the development is not considered to be contrary to any of the national and local planning policies regarding air quality.

APPENDIX A - FIGURES

Figure A-1 Air Quality Assessment Area



APPENDIX B - REPORT TERMS & CONDITIONS

This Report has been prepared using reasonable skill and care for the sole benefit of PDE Consulting Limited ("the Client") for the proposed uses stated in the report by Tetra Tech Limited ("Tetra Tech"). Tetra Tech exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

No liability is accepted, or warranty given for; unconfirmed data, third party documents and information supplied to Tetra Tech or for the performance, reliability, standing etc. of any products, services, organisations or companies referred to in this report. Tetra Tech does not purport to provide specialist legal, tax or accounting advice.

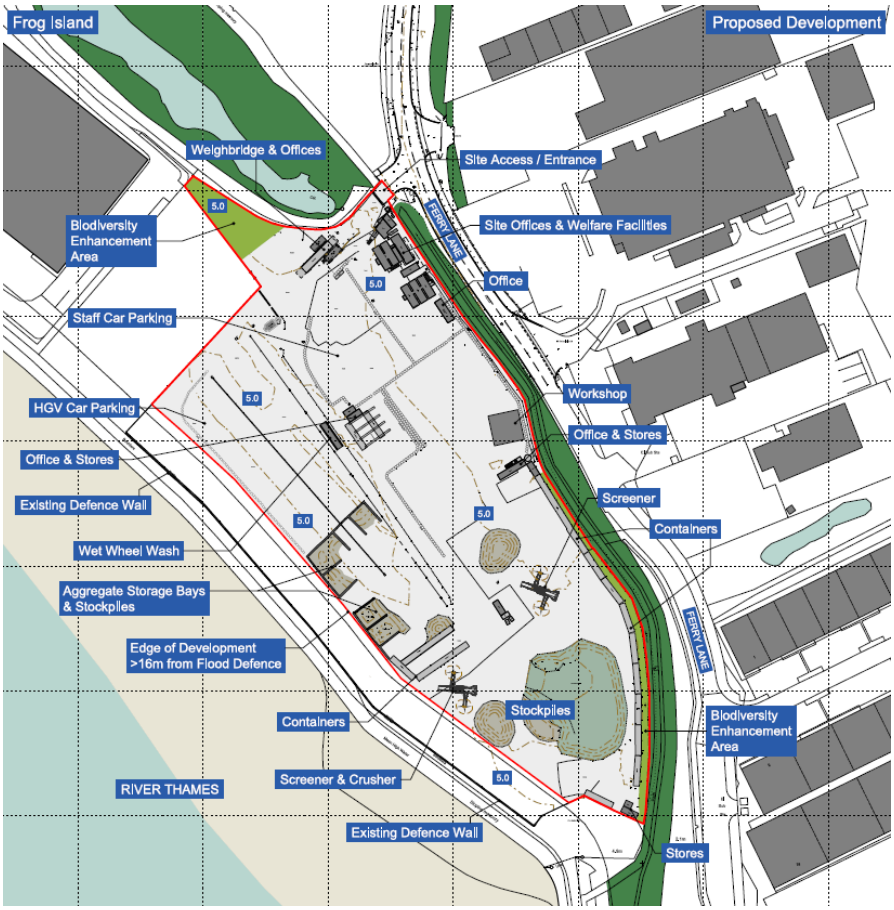
The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including; its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. Tetra Tech accept no liability for issues with performance arising from such factors.

APPENDIX B – FROG ISLAND PARTICULATE MATTER AIR QUALITY ASSESSMENT – TETRA TECH – SEPTEMBER 2022

Frog Island, Ferry Lane South, Rainham, RM13 9DB



Particulate Matter Air Quality Assessment for Planning Application

784-B034766 (Frog Island)
20th September 2022

PRESENTED TO

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DOCUMENT CONTROL

Document:	**Particulate Matter Air Quality Assessment**
Project:	Waste Recycling Facility, Frog Island, Ferry Lane South, Rainham, RM13 9DB
Client:	PDE Consulting Limited
Job Number:	784-B034766 (Frog Island)
File Origin:	\\lds-dc-vm-101\Data\Projects\784-B034776 PDE Various Sites AQ\

Issue:	**1**	**Status:**	**First Issue**
Date:	31st August 2022		
Prepared by: Zhiyuan Yang Principal Environmental Consultant		**Checked by** Matthew Smith Principal Environmental Consultant	**Approved By:** Nigel Mann Director

Issue:	**2**	**Status:**	**2nd Issue**
Date:			
Prepared by: Zhiyuan Yang Principal Environmental Consultant		**Checked by:** Matthew Smith Principal Environmental Consultant	**Approved By:** Nigel Mann Director
Description of revision: Updated with the revised site boundary.			

Issue:		**Status:**	
Date:			
Prepared by:		**Checked by:**	**Approved By:**
Description of revision:			

EXECUTIVE SUMMARY

The report presents the findings of a detailed particulate matter (PM_{10} & $PM_{2.5}$) impact assessment to determine whether the impacts of PM_{10} & $PM_{2.5}$ emissions from the operations/activities at Frog Island, Ferry Lane South, Rainham, Essex, RM13 9DB (the 'Site'), meet the required air quality standards (AQSs for the protection of human health.

This Site is used for the importation, storage and treatment of up to 209,000 tonnes of waste per year to produce secondary aggregate.

Baseline air quality conditions have been defined. Two particulate matter emission scenarios from the site activities have been assessed:

- Scenario 1 - using the typical or average values of the particulate matter emission factors for the site activities and operation conditions; and
- Scenario 2 - using the maximum or worst-case values of the particulate matter emission factors for the site activities and operation conditions.

Detailed dispersion modelling using AERMOD modelling software has been undertaken and the modelling results have been presented in this report in terms in terms of the emitted pollutant Process Contribution (PC) and Predicted Environmental concentration (PEC = PC+ Background concentration). The modelling used the most representative meteorological dataset. The worst-case, highest predicted long-term and short-term PECs were compared to the appropriate Air Quality Objectives / Environmental Assessment Levels (AQOs/ EALs) for the protection of human health.

Scenario 1 Results

The long-term and short-term predicted environmental concentrations of PM_{10} from the facility operations at the identified receptor locations are all below the relevant air quality objectives for the protection of human health. The significance of the PM_{10} impact is determined to be 'negligible' for all the considered receptors.

The long-term predicted environmental concentrations of $PM_{2.5}$ from the facility operations at the identified receptor locations are all below the relevant air quality objectives for the protection of human health. The significance of the $PM_{2.5}$ impact is determined to be 'negligible' to 'slight' for all the considered receptors.

Scenario 2 Results

The long-term and short-term predicted environmental concentrations of PM_{10} from the facility operations at the identified receptor locations are all below the relevant air quality objectives for the protection of human health. The significance of the PM_{10} impact is determined to be 'negligible' for all receptors.

The long-term predicted environmental concentrations of $PM_{2.5}$ from the facility operations at the identified receptor locations are all below the relevant air quality objectives for the protection of human health. The significance the $PM_{2.5}$ impact is determined to be 'negligible' to 'slight for all the residential receptors.

Therefore, the predicted PM_{10} and $PM_{2.5}$ concentrations from the Site operations are considered acceptable for the protection of human health for both scenarios 1 and 2.

The detailed dispersion modelling exercises have identified that the particulate matter emission from site surfaces from the moving loading shovel is a major source. Therefore, the mitigation controls including removal and reduction of the materials on the surface where the loading shovel is travelling on (to reduce the silt loading values for the surface) are included in the Dust Management Plan. The mitigation control measures will also include an adequate supply of water for spray equipment (bowser, hoses and/or mist sprays) to ensure that the rate of application would be sufficient for the purpose of dampening ground surfaces, and materials in stockpiles.

Suspended particulate matter will be dispersed away in the air from the sources and the generated particulate matter is unlikely to result in a particulate deposition level above 1000 mg m-2 day-1 at any identified ecological receptors at River Thames SINC/Tidal Tributaries SINC, Rainham Marshes LNR, and Inner Thames Marshes SSSI. The significance of the particulate matter impact on the ecological sites is 'negligible'.

It is considered that with these controls in place the significance/effect of PM_{10}/$PM_{2.5}$ impact of the scheme will be acceptable.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ADMS	Atmospheric Dispersion Modelling Software
AERMOD	The AERMOD atmospheric dispersion modelling system
AQAL	the Air Quality Assessment Level
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
CIEEM	Chartered Institute of Ecology and Environmental Management
CLRTAP	Convention on Long-range Transboundary Air Pollution
DEFRA	Department for Environment Food & Rural Affairs
DPD	Development Plan Document
EAL	Environmental Assessment Limits
EC	European Commission
ELWA	East London Waste Authority
EPUK	Environmental Protection UK
EU	European Union
EPAQS	The Expert Panel on Air Quality Standards
GLA	Greater London Authority
HGV	Heavy Goods Vehicles
IAQM	The Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
LBH	The London Borough of Havering
NGR	The United Kingdom National Grid Reference
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NPPF	The National Planning Policy Framework
OS	the UK Ordnance Survey
PC	Process Contribution
PEC	Predicted Environment Concentration
PM_{10}	An air pollutant consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 micrometre
$PM_{2.5}$	Particulate Matter (particles with diameter of 2.5 micrometres or less)
SAC	Special Areas of Conservation
SINC	sites of importance for nature conservation
SPA	Special Protection Area
SPG	London Plan Supplementary Planning Guidance

Acronyms/Abbreviations	Definition
SSSI	Sites of Special Scientific Interest
TfL	Transport for London
WHO	World Health Organization
UK	The United Kingdom

1.0 INTRODUCTION

Tetra Tech Limited have been commissioned by PDE Consulting Limited to undertake an air quality modelling assessment of particulate matter (PM_{10} and $PM_{2.5}$) impact in support of a planning application for a waste facility at Frog Island, Ferry Lane South, Rainham, Essex, RM13 9DB (the 'Site').

This Site is used for the importation, storage and treatment of up to 209,000 tonnes of waste per year to produce secondary aggregate.

Wastes are imported to the Site by road in sheeted heavy goods vehicles (HGV). All wastes are visually inspected on arrival at the Site. Waste shall only be accepted if:

- it conforms to the description in the documentation supplied by the producer and holder;
- it does not consist solely or mainly of dusts, powders or loose fibres;
- it is not hazardous waste; and
- wastes are not in liquid form.

Detailed PM_{10} and $PM_{2.5}$ modelling assessments have been undertaken to determine whether the impacts from facility emissions meet the required air quality standards (AQSs) for the protection of human health.

1.1 SITE LOCATION

The Site is situated off Ferry Lane in Rainham, Essex and is approximately 1.6 km to the southwest of Rainham town centre within an industrial estate. The River Thames is located to the southwest of the Site. There are no residential receptors within 1 km of the Site.

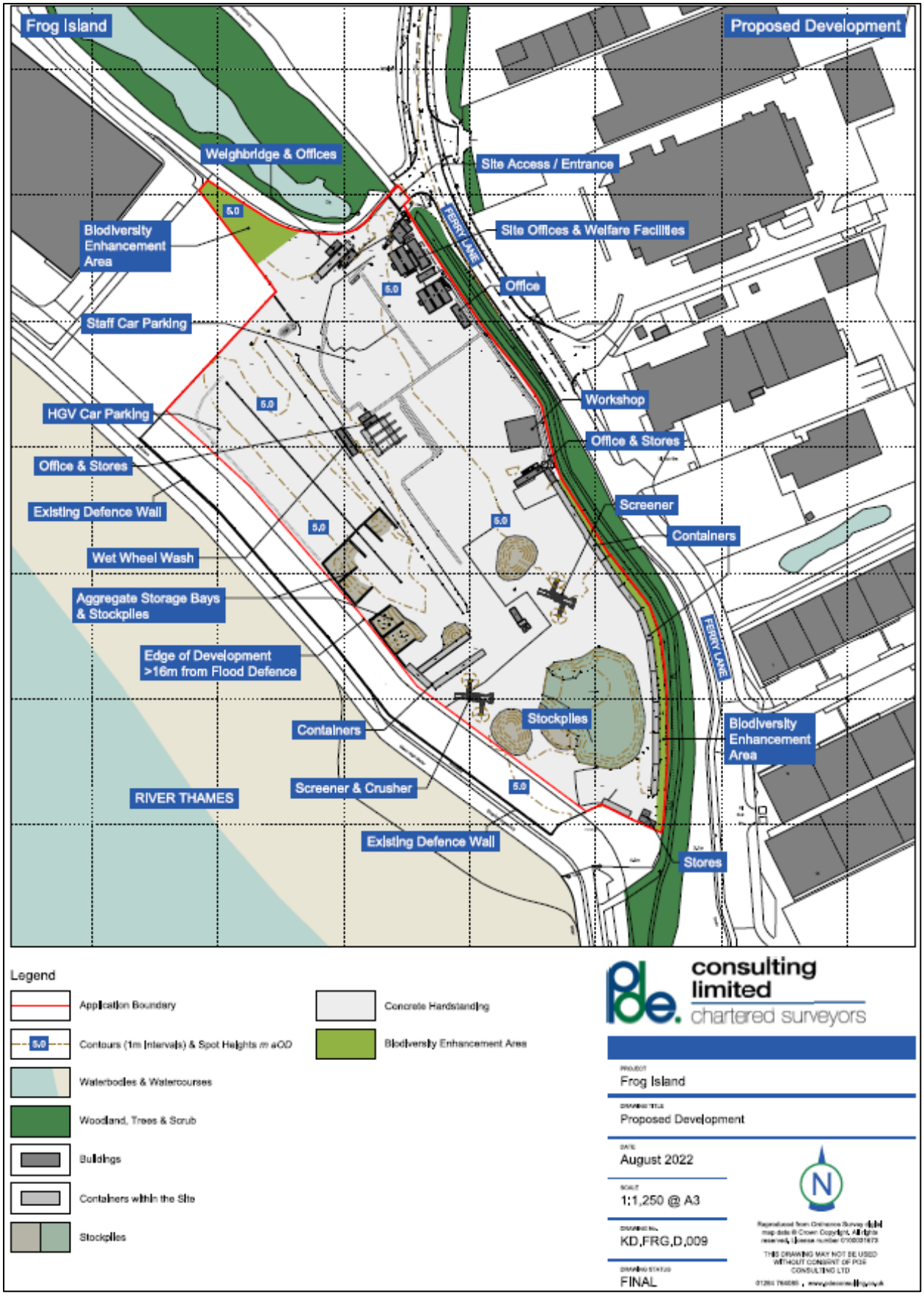
The Site is located within the London Borough of Havering in an Air Quality Management Area (AQMA) for Particulate Matter (PM_{10}). The London Borough of Havering AQMA was declared in September 2006. The source of the pollution is reported to be road traffic.

The approximate OS reference for the site is 551280, 185880. The location of the site is shown in **Figure 1-1**.

The site layout plan is shown in **Figure 1-2**.

Figure 1-1. Site Location and Surrounding Area

Figure 1-2. Site Layout Plan



1.2 REPORT STRUCTURE

Following this introductory section, the remainder of this report is structured as follows:

- Section 2: Policy and Legislative Context
- Section 3: Particulate Matter Assessment Methodology
- Section 4: Baseline Conditions
- Section 5: Detailed Modelling Methodology
- Section 6: Detailed PM_{10} and $PM_{2.5}$ Modelling Assessment Results
- Section 7: Conclusions

All technical Appendices are included at the end of this report for information.

2.0 POLICY AND LEGISLATIVE CONTEXT

2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised July 2021;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, 2007;
- The Environment Act, 1995;
- The Environment Act, 2021;
- Local Air Quality Management Technical Guidance LAQM.TG(16), Defra, 2021;
- London Local Air Quality Management Technical Guidance LLAQM.TG19, Mayor of London, 2019;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, LA 105 Air quality, Highways England, November 2019;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1), IAQM, May 2020;
- Ecological Assessment of Air Quality Impacts, CIEEM, January 2021.
- London Plan Supplementary Planning Guidance (SPG) 'The Control of Dust and Emissions during Construction and Demolition', July 2014;
- Greater London Authority (GLA) London Environment Strategy, May 2018;
- Greater London Authority (GLA) The London Plan, March 2021;

- Greater London Authority, Sustainable Design & Construction Supplementary Planning Guidance, April 2014;

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- emapsite.com;
- MAGIC (http://magic.defra.gov.uk/);
- Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/); and,
- The London Borough of Havering website: http://www.havering.gov.uk

Site Specific Reference Documents

- The London Borough of Havering air quality annual status report for 2015, August 2016
- London Borough of Havering Air quality Action Plan 2018 -2023; and
- The LBH Council adopted the Havering Local Plan 2016 – 2031, Adopted November 2021.

2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality 'Daughter' Directive – sets ambient air limit values for NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **Directive 2000/69/EC** – the Second Air Quality 'Daughter' Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality 'Daughter' Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in Scotland, Wales and Northern Ireland.

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

UK Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amends the AQO for $PM_{2.5}$ outlined within the Air Quality Standards Regulations (2010 & 2016 Amendments).

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in **Table 2-1** along with European Commission (EC) Directive Limits and/or World Health Organisation (WHO) Guidelines. The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

Table 2-1. Air Quality Standards, Objectives, Limits and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50µg/m^3 by end of 2004 (max 35 exceedances a year)	24-hour Mean	1st January 2005	50µg/m^3 by end of 2004 (max 35 exceedances a year)	1st January 2005	Retain Existing
	UK	40µg/m^3 by end of 2004	Annual Mean	1st January 2005	40µg/m^3	1st January 2005	

$PM_{2.5}$	UK	20µg/m^3	Annual Mean	1st January 2020	-	-	Retain Existing

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA).

Environment Act 2021

The Environment Act (2021) introduces a commitment to create a legally binding duty on government to reduce the concentrations of fine particulate matter ($PM_{2.5}$) in ambient air, and to set a long-term target expected to be 10 µg/m^3, a reduction from the current Air Quality objective of 20 µg/m^3 set out within the Air Quality Standards Regulations (Amendment 2016). A draft of a statutory instrument (or drafts of statutory instruments) containing regulations setting the $PM_{2.5}$ air quality target must be laid before Parliament on or before 31st October 2022 and is expected to come into force thereafter.

2.3 PLANNING AND POLICY GUIDANCE

National Policy

The National Planning Policy Framework (NPPF), last updated 20 July 2021, sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

The purpose of the planning system is to contribute to the achievement of sustainable development. NPPF states three objectives for sustainable development.

"8. Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient

number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and

c) an environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

The following section in NPPF is related to the improvement of air quality:

"186 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."

GLA, The London Plan

The London Borough of Havering (LBH) lies within the Greater London Authority (GLA) Area. 'The London Plan – the spatial development strategy for Greater London', March 2021 addresses topics related to the improvement of air quality.

"Policy SI 1 Improving Air Quality

A. 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.

B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1) Development proposals should not:

a. lead to further deterioration of existing poor air quality

b. create any new areas that exceed air quality limits, or delay the date at which compliance with be achieved in areas that are currently in exceedance of legal limits

c. reduce air quality benefits that results from the Mayor's or boroughs' activities to improve air quality

d. create unacceptable risk of high levels of exposure to poor air quality.

2) In order to meet the requirements in Part 1, as a minimum:

a) development proposals must be at least Air Quality Neutral

b) 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

c) 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

d) 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.

C. *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:*
   1) *how proposals have considered ways to maximise benefits to local air quality, and*
   2) *what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.*

D. *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 (The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance, Mayor of London, 2014).*

E. *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."*

"Policy SI 8 Waste capacity and net waste self-sufficiency

A. In order to manage London's waste sustainably:

1) the equivalent of 100 per cent of London's waste should be managed within London (i.e. net self-sufficiency) by 2026;

2) existing waste management sites should be safeguarded (see Policy SI 9 Safeguarded waste sites);

3) the waste management capacity of existing sites should be optimised;

4) new waste management sites should be provided where required;

5) environmental, social and economic benefits from waste and secondary materials

management should be created.

B. Development Plans should:

1) plan for identified waste needs;

2) identify how waste will be reduced, in line with the principles of the Circular Economy and how remaining quantums of waste will be managed;

3) allocate sufficient sites, identify suitable areas, and identify waste management facilities to provide the capacity to manage the apportioned tonnages of waste, as set out in Table 9.2 – boroughs are encouraged to collaborate by pooling their apportionment requirements.

4) identify the following as suitable locations to manage borough waste apportionments:

a) existing waste and secondary material sites/land, particularly waste transfer facilities, with a view to maximising their capacity;

b) Strategic Industrial Locations and Locally Significant Industrial Sites;

c) safeguarded wharves with an existing or future potential for waste and secondary material management.

C. Mayoral Development Corporations must cooperate with host boroughs to meet identified waste needs.

D. Development proposals for materials and waste management sites are encouraged where they:

1) deliver a range of complementary waste management and secondary material processing facilities on a single site;

2) support prolonged product life and secondary repair, refurbishment and remanufacture of materials and assets;

3) contribute towards renewable energy generation, especially renewable gas technologies from organic/biomass waste; and/or

4) are linked to low emission combined heat and power and/or combined cooling heat and power (CHP is only acceptable where it will enable the delivery or extension of an area-wide heat network consistent with Policy SI 3 Energy infrastructure Part D1c).

E. Developments proposals for new waste sites or to increase the capacity of existing sites should be evaluated against the following criteria:

1) the nature of the activity, its scale and location;

2) effective implementation of the waste hierarchy and its contribution to London's circular economy;

3) achieving a positive carbon outcome (i.e. re-using and recycling high carbon content materials) resulting in significant greenhouse gas savings – all facilities generating energy from waste will need to meet, or demonstrate that steps are in place to meet, a minimum performance of 400g of CO_2 equivalent per kilowatt hour of electricity produced;

4) the impact on amenity in surrounding areas (including but not limited to noise, odours, air quality and visual impact) – where a site is likely to produce significant air quality, dust or noise impacts, it should be fully enclosed;

5) *the transport and environmental impacts of all vehicle movements related to the proposal – the use of renewable fuels from waste sources and the use of rail and waterway networks to transport waste should be supported.*

F. *When planning for new waste sites or to increase the capacity at existing sites the following should be considered:*

1) *job creation and social value benefits, including skills, training and apprenticeship opportunities;*
2) *local need;*
3) *accessibility of services for local communities and businesses."*

"Policy T4 Assessing and mitigating transport impacts transport

A. *Development Plans and development proposals should reflect and be integrated with current and planned transport access, capacity and connectivity.*
B. *When required in accordance with national or local guidance, transport assessments/statements should be submitted with development proposals to ensure that impacts on the capacity of the transport network (including impacts on pedestrians and the cycle network), at the local, network-wide and strategic level, are fully assessed. Transport assessments should focus on embedding the Healthy Streets Approach within, and in the vicinity of, new development. Travel Plans, Parking Design and Management Plans, Construction Logistics Plans and Delivery and Servicing Plans will be required having regard to Transport for London guidance.*
C. *Where appropriate, mitigation, either through direct provision of public transport, walking and cycling facilities and highways improvements or through financial contributions, will be required to address adverse transport impacts that are identified.*
D. *Where the ability to absorb increased travel demand through active travel modes has been exhausted, existing public transport capacity is insufficient to allow for the travel generated by proposed developments, and no firm plans and funding exist for an increase in capacity to cater for the increased demand, planning permission will be contingent on the provision of necessary public transport and active travel infrastructure.*
E. *The cumulative impacts of development on public transport and the road network capacity including walking and cycling, as well as associated effects on public health, should be taken into account and mitigated.*
F. *Development proposals should not increase road danger."*

Local Plan – the London Borough of Havering

The LBH Council adopted the Havering Local Plan 2016 – 2031 (adopted November 2021), which outlines the Council's broad planning strategy. Following a review of policies within the development core strategy, the following statements were identified as being relevant to the proposed development from an air quality perspective:

"Policy 12 Healthy Communities

The Council will support development in Havering that provides opportunities for healthy lifestyles,

contribute to the creation of healthier communities and helps reduce health inequalities.

The Council will seek to maximise the potential health gains from development proposals and ensure that any negative impacts are mitigated. All major development proposals must be supported by a Health Impact Assessment (HIA) to demonstrate that full consideration has been given to health and wellbeing.

The Local Plan will promote health and wellbeing by: …

viii. Seeking environmental improvements, minimising exposure to pollutants and improving air quality (refer to Policies 33 and 34);

Developers are required to consider wider local/regional primary care and other health strategies, as appropriate, to take into account how any developments can contribute to the aims and objectives of those strategies."

"Policy 19: Business Growth

The Council is committed to building a strong and prosperous economy in Havering and will encourage and promote business growth by:

i. Protecting designated Strategic Industrial Locations for industrial uses as set out in the London Plan;

ii. Protecting designated Locally Significant Industrial Sites for B1 (b) (c), B2 and B8 uses; …."

Waste uses will be assessed in accordance with the Joint Waste Development Plan Document.

"Policy 23: Transport Connections

The Council will support and encourage developments in Havering in the locations that are most accessible by a range of transport options.

The Council supports development which ensures safe and efficient use of the highway and demonstrates that adverse impacts on the transport network are avoided or, where necessary, mitigated. Major planning applications will require a transport assessment in line with TfL's Transport Assessment Best Practice Guidance.

When bringing forward a planning application full Travel Plans or Travel Plan Statements will be required for development reaching certain thresholds as set out in Transport for London's (TfL) latest Guidance on Travel Plan requirements.

The Council will work with its partners, including developers, the Mayor of London and central government to improve transport infrastructure and the connectivity of the borough by: …

xi. Tackling key congestion "hotspots" through remodelling of Gallows Corner and Romford Ring Road to improve motor vehicle traffic flow and improve air quality;

The Council will work positively with those who share its ambition to deliver these key transport infrastructure improvements and will support development proposals that are able to contribute to their

delivery."

"Policy 33 Air Quality

The Council is committed to improve air quality in Havering to improve the health and wellbeing of Havering's residents. The Council will support development which:

i. Is at least air quality neutral;
ii. Optimises the use of green infrastructure to reduce pollution concentrations and exposure (see Policy 29);
iii. Delivers measures to support active travel to reduce emissions (see Policy 23)
iv. Meets the targets for carbon dioxide reduction in the London Plan (see Policy 36); and
v. *Minimises emissions from construction (see Policy 34)."*

"Policy 34 Managing pollution

The Council will support development proposals that:

i. Do not unduly impact upon amenity, human health and safety and the natural environment by noise, dust, odour and light pollution, vibration and land contamination;
ii. Do not pose an unacceptable risk to the quality of the water catchment, groundwater or surface water; and
iii. Optimise the design, layout and orientation of buildings and the use of green infrastructure to minimise exposure to the above pollutants"

Joint waste development plan for the east London Waste Authority boroughs

The Joint Waste DPD has been developed by the four East London Waste Authority (ELWA) boroughs of LB Barking & Dagenham, Havering, Newham and Redbridge. The DPD was adopted February 2012.

"Policy W5: General Considerations with regard to Waste Proposals

Planning permissions for a waste related development will only be granted where it can demonstrate that any impacts of the development can be controlled to achieve levels that will not significantly adversely affect people, land, infrastructure and resources.

Applications for new facilities that manage non-apportioned waste must demonstrate that there is not a more suitable site nearer the source of waste arising with regard to the factors listed below.

The information supporting the planning application must include, where relevant to a development proposal, assessment of the following matters and where necessary, appropriate mitigation should be identified so as to minimise or avoid any material adverse impact and compensate for any loss including:

(i) the release of polluting substances to the atmosphere or land arising from facilities and transport;
(ii) the amount of greenhouse gases produced;
(iii) the development on sites that are likely to be at greater risk now, or over the lifetime of the development due to climate change;

(iv) the likely increase in pressure on resources with climate change;

(v) the contamination of ground and surface water;

(vi) the drainage of the site and adjoining land and the risk of flooding;

(vii) water consumption requirements and consideration of water management within operational plant;

(viii) groundwater conditions and the hydrogeology of the locality;

(ix) the visual and landscape impact of the development on the site and surrounding land, including townscape and agricultural land;

(x) in the case of buildings, demonstration of high quality of design and sustainable construction and drainage techniques;

(xi) adverse effects on neighbouring amenity including transport, noise, fumes, vibration, glare, dust, litter, odour and vermin;

(xii) transport impact of all movements, including opportunities for use of sustainable transport modes, traffic generation, access and the suitability of the highway network in the vicinity, access to and from the primary route network;

(xiii) adverse impacts of all movements including: traffic generation, an unsuitable highway network, inadequate accessibility to the site or the primary road network in the vicinity; and limited or no opportunities for the use of sustainable transport modes;

(xiv) the loss or damage to significant biodiversity conservation interests;

(xv) the loss or damage to the historic environment, archaeological and cultural resources of value and importance;

(xvi) potential danger to aircraft from bird strike and structures;

(xvii) scope for limiting the duration of use; and

(xviii) the management arrangements for residues arising from any waste management facility."

3.0 PARTICULATE MATTER ASSESSMENT METHODOLOGY

The potential environmental effects from the operation of the facility will be assessed according to the latest guidance produced by EPUK and IAQM in in January 2017 '*Land-Use Planning & Development Control: Planning for Air Quality*'.

3.1 DETERMINING IMPACT DESCRIPTION OF THE AIR QUALITY EFFECTS

The impact description of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall impact description of the air quality effects based on severity of air quality impacts.

The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The effects are provided as a percentage of the Air Quality Objective (AQO), which may be an AQO, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
2. The absolute concentrations are also considered in terms of the AQO and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQO;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQO will have higher severity compared to a relatively large change at a receptor which is significantly below the AQO;
4. The effects can be adverse when pollutant concentrations increase or beneficial when concentrations decrease as a result of development;
5. The judgement of overall impact description of the effects is then based on severity of effects on all the individual receptors considered; and,
6. Where a development is not resulting in any change in emissions itself, the impact description of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQO.

Table 3-1. Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2-5	6-10	>10
≤75% of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109 of AQO	Moderate	Moderate	Substantial	Substantial
≥110 of AQO	Moderate	Substantial	Substantial	Substantial

In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance, the Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

4.0 BASELINE CONDITIONS

4.1 BACKGROUND AIR QUALITY REVIEW

This section provides a review of the existing air quality in the vicinity of the application site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the application site has been defined from several sources, as described in the following sections.

Following sources for background air quality information have been reviewed:

- UK Air and Havering Air Quality Annual Status Report 2021;
- Defra Background Pollutant Mapping; and
- Background pollutant on London Air.

4.1.1 UK Air and Havering Air Quality Annual Status Report

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, London Borough of Havering (LBH) has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction.

Air Quality Management Area (AQMA)

An AQMA was declared by LBH in 11/09/2006. An area encompassing the entire London Borough of Havering has been declared for particulate matter PM_{10} (24-hour mean).

Air Quality Monitoring

Monitoring of PM_{10} within Borough Council has been undertaken through both automatic monitoring methods in 2020 These have been reviewed in order to provide an indication of existing air quality in the area surrounding the application site.

Automatic Monitoring

In 2020, the air quality in Havering is measured via two automatic Air Quality Monitoring Stations located at;

- Waterloo Road, Romford; and
- A1306 New Road, Rainham.

Details of automatic monitoring sites are presented in **Table 4-1**.

Table 4-1. Monitored Annual Mean PM_{10} Concentrations

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Inlet Height (m)
HV1 Rainham	Roadside	553127	182506	PM_{10}	Y	Chemiluminescence, TEOM, FDMS	3	10	3
HV3 - Romford	Roadside	551108	188257	PM_{10}	Y	Chemiluminescence, TEOM, FDMS	3	8	3

The annual mean concentration data available from those stations between 2016 and 2020 are presented in **Table 4-2**.

Table 4-2. Monitored Annual Mean PM_{10} Concentrations

Site ID	Site Type	Within AQMA?	PM_{10} Annual Mean Concentration(µg/m^3)				
			2016	2017	2018	2019	2020
HV1 Rainham	Roadside	Yes	19	18	17	17.4	15
HV3 - Romford	Roadside	Yes	15	19	20	20.5	21

As **Table 4-2** illustrates, the recorded pollutant concentrations at the automatic monitoring site were below the relevant AQOs, with exception of the monitored data.

The 24-hour mean concentration data available from this station from 2016 and 2020 are presented in **Table 4-3**.

Table 4-3. Monitored 24-Hour Mean PM_{10} Concentrations and Number of PM 24-Hour Means > 50µg/m^3

Site ID	Valid data capture for monitoring period %(a)	Valid data capture 2020 %(b)	Number of Exceedances of 24-Hour Mean (50 µg/m^3)				
			2016	2017	2018	2019	2020
HV1 Rainham	-	99	6	4	1	4	1
HV3 - Romford	-	91	5	N/A	2	9	5

Where data capture for the full calendar year was less than 90%, the 90.4th percentile of 24-hour means is shown in brackets.

(a) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(b) data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

As **Table 4-3** illustrates, the recorded pollutant concentrations at the automatic monitoring sites were below the relevant 24-hour mean AQOs.

Annual mean $PM_{2.5}$ automatic monitoring results are presented in **Table 4-4**.

Table 4-4. Monitored Annual Mean $PM_{2.5}$ Concentrations

Site ID	Valid data capture for monitoring period %(a)	Valid data capture 2020 %(b)	Annual Mean Concentration (µg/m³)				
			2016	2017	2018	2019	2020
HV1 Rainham	-	99	12	12	11	11.1	9

All means have been "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75% and more than 33%. (a) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year. (b) Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

As shown in **Table 4-4**, the recorded annual mean $PM_{2.5}$ concentrations over the 5-year period at the automatic monitoring sites were below the relevant annual mean AQOs.

4.1.2 Background Pollutant Mapping

Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site.

The background data were published by Defra in a data group named as "Background Maps 2018" for PM_{10} and $PM_{2.5}$ in August 2020.

The updated mapped background concentrations surrounding the Site are summarised in **Table 4-5**.

Table 4-5. Published Background Air Quality Levels (µg/m³)

UK NGR(m)		2021		2022	
X	Y	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
551500	184500	16.41	11.11	16.22	10.96

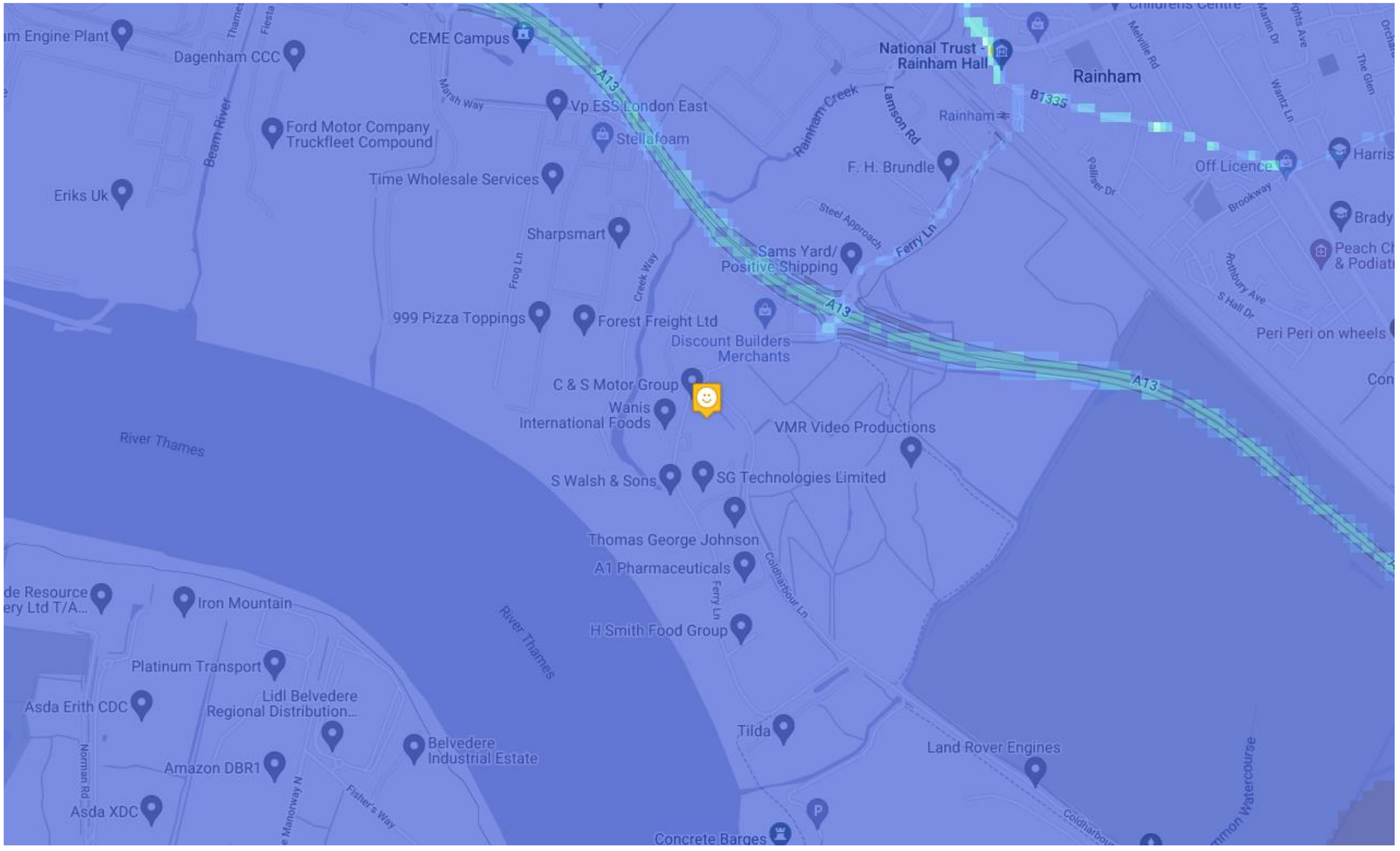
4.1.3 Background Pollutant on London Air

London Air Annual Maps

London Air's annual mean pollution map uses a detailed model to show a prediction of PM_{10} and $PM_{2.5}$ annual averages across the whole of Greater London (https://londonair.org.uk/london/asp/annualmaps.asp).The latest annual mean air pollutions were modelled based on measurements made during 2016.

The detailed annual mean pollution maps of PM_{10} and $PM_{2.5}$ surrounding the Stie are displayed in **Figure 4-1** and **Figure 4-2**.

Figure 4-1. London Air Modelled Annual Mean PM_{10} Air Pollution (based on measurements in 2016)

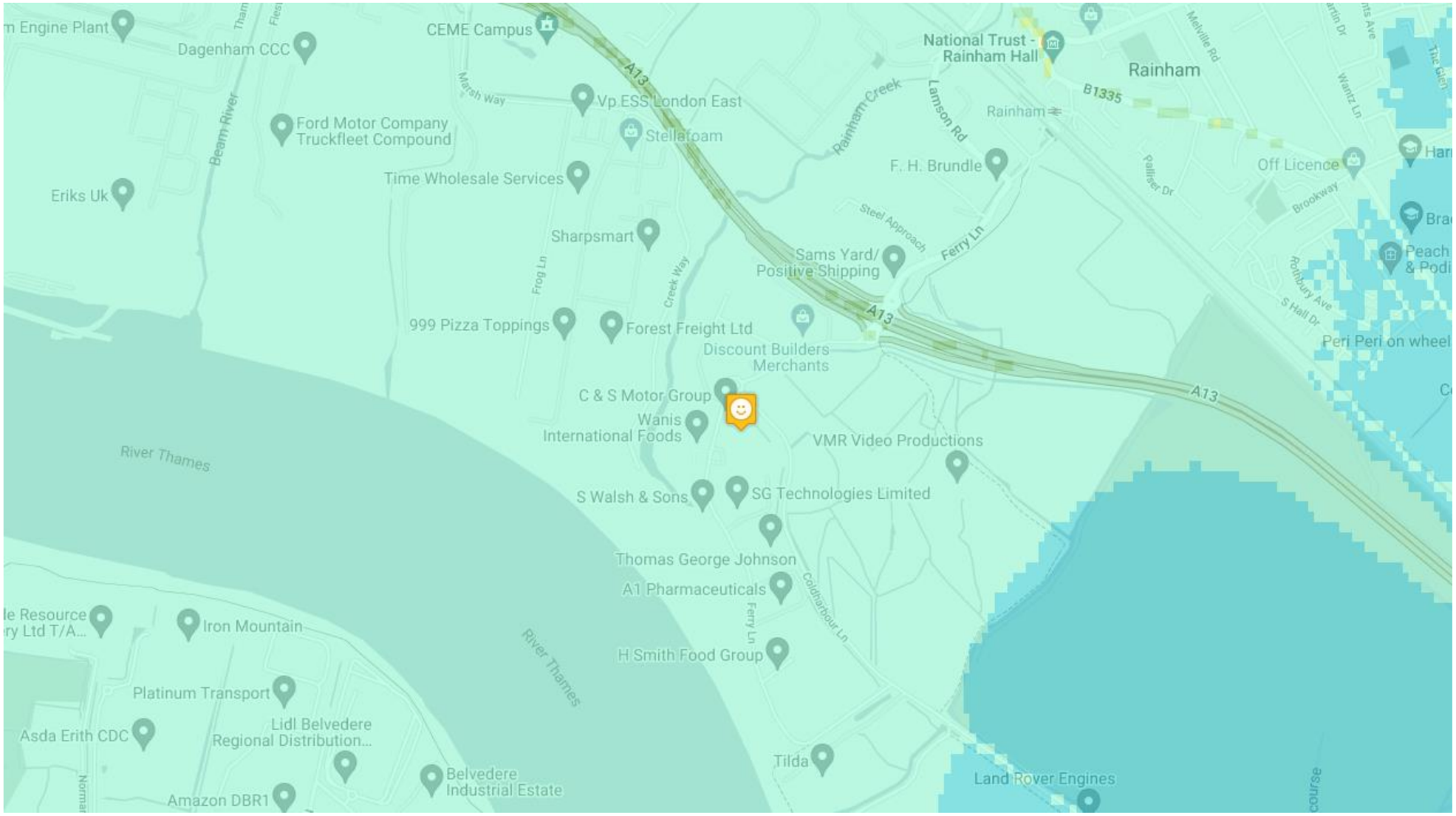


Key: Annual mean PM10 air pollution for 2016, in microgrammes per metre cubed (ug/m3)

<16	16	19	22	25	28	31	34	37	40	43	46	49	52	55	>58

Passes annual mean objective **Fails annual mean objective**

Figure 4-2. London Air Modelled Annual Mean $PM_{2.5}$ Air Pollution (based on measurements in 2016)



Key: Annual mean PM2.5 air pollution for 2016, in microgrammes per metre cubed (ug/m3)

<12	12	14	16	18	20	>22

Passes annual mean objective **Fails annual mean objective**

Figure 4-1 shows the predicted PM_{10} background is approximately 16 µg/m^3 at the Site and **Figure 4-2** shows the predicted $PM_{2.5}$ background is approximately 12 µg/m^3 at the Site. Both PM_{10} and $PM_{2.5}$ are below the annual mean objectives.

4.2 PM_{10} AND $PM_{2.5}$ BACKGROUND INCLUSIVE OF CONTRIBUTIONS FROM TRAFFIC EMISSIONS

Traffic emissions have been considered at selected receptor locations. A verified baseline traffic model has been produced using ADMS Roads to determine baseline pollutant levels for PM_{10} and $PM_{2.5}$. A traffic air quality impact assessment has been undertaken by Tetra Tech and the assessment results have been presented in a report titled 'Air Quality Assessment,' Report Reference: 784-B034776, 18th August 2022. Background concentrations of PM_{10} and $PM_{2.5}$ used in this assessment are presented in **Table 4-6** and the details of the selected receptors are discussed further in Section 5.2.

Table 4-6. Background Concentrations Used in the Assessment

Discrete Sensitive Receptors		Concentration (µg/m^3)	
		PM_{10}	$PM_{2.5}$
D1	8 Manstead Gardens Rainham (residential)	18.8	12.32
D2	6 River Close Rainham (residential)	18.63	12.23
D3	56 Elizabeth Road (residential)	18.49	12.14
D4	15 Palliser Drive Rainham (residential)	18.42	12.1
D5	21 Broadway, Rainham (residential)	17.78	11.95
D6	Flat 49 Dunedin Road (residential)	17.93	12.04
D7	2a Phillip Road (residential)	17.79	11.96
D8	107 New Road (residential)	19.14	12.75
D9	162 Oval Road South Dagenham	17.35	11.8
D10	16 Sunningdale close London (residential)	17.26	11.96
D11	23 Bayliss Avenue (residential)	17.89	12.08
D12	140 Norman Road (residential)	17.06	11.58
D13	30 Poppy Close Belvedere (residential)	17.06	11.58
D14	1 Beltwood Road Belvedere (residential)	17.13	11.73
D15	4 Ashburnham Road Belvedere (residential)	17.13	11.73
D16	50 Battle Road Erith (residential)	17.13	11.73
D17	51 Lower Road Erith (residential)	17.13	11.73
D18	32 Galleon Close Erith (residential)	17.13	11.73
D19	116 Chandlers Drive Erith (residential)	16.05	10.98
D20	H Smith Food Group	15.78	10.77
D21	Quantum Group	15.8	10.79
D22	The EA MMF10 [a]	15.84	10.81
D23	Thermit Welding on Ferry Lane	15.86	10.82
D24	TotalFood Distribution Ltd	18.09	12.01
D25	Shanks Municipal waste Management	15.83	10.81
D26	Footpath	17.98	11.94

5.0 DETAILED MODELLING METHODOLOGY

In order to consider the air quality impacts of the facility on the local air quality a quantitative assessment using the third generation Breeze AERMOD dispersion model has been undertaken. AERMOD is a development from the ISC3 dispersion model and incorporates improved dispersion algorithms and pre-processors to integrate the impact of meteorology and topography within the modelling output.

The model utilises hourly meteorological data to define conditions for plume rise, transport, diffusion and deposition. It estimates the concentration for each source and receptor combination for each hour of input meteorology and calculates user-selected short-term averages.

5.1 MODELLING PARAMETER AND AVERAGING PERIOD

The dispersion modelling has assessed impact of emissions from the facility operation.

The same averaging period should be used for comparison of emissions against environmental standards. For example, most long-term standards are expressed as an annual mean and many short-term standards as an hourly mean. Note that there are certain exceptions to this which are important when considering compliance with statutory EQS. The averaging period associated with the relevant modelled pollution are detailed in **Table 5-1**.

Table 5-1. Modelling Parameter and Averaging Period

Parameter	Modelled Period	
	Short Term	Long Term
PM_{10}	90.41th %ile 24-hour mean	Annual mean
$PM_{2.5}$	-	Annual mean

For short term averaging periods the following LAQM TG16 (April 2021) methodology, for example, has been followed:

For 24-hour mean concentrations:

- Add the PC value to the annual mean PM_{10} background concentration to calculate the total 90.4th percentile 24-hour mean concentration in England, Wales and Northern Ireland.

5.2 SENSITIVE RECEPTORS

Discrete (Individual) Receptors – for the Protection of Human Health

The discrete sensitive receptors identified for the purposes of this air quality assessment are contained in **Table 5-2** and **Figure 5-1**.

The assessment has also been undertaken to determine the potential impacts at those selected receptors.

It should be noted that these do not represent an exhaustive list of all receptors within the vicinity of the Site, rather they are worst case representative locations within and adjacent to the site.

Table 5-2. Modelled Sensitive Receptors – for the Protection of Human Health

Discrete Sensitive Receptor		UK NGR (m)	
		X	Y
D1	8 Manstead Gardens Rainham (residential)	552835	181399
D2	6 River Close Rainham (residential)	552701	181532
D3	56 Elizabeth Road (residential)	552530	181677
D4	15 Palliser Drive Rainham (residential)	552341	181862
D5	21 Broadway, Rainham (residential)	552028	182193
D6	Flat 49 Dunedin Road (residential)	551717	182662
D7	2a Phillip Road (residential)	551345	182782
D8	107 New Road (residential)	550865	182912
D9	162 Oval Road South Dagenham	550089	183178
D10	16 Sunningdale close London (residential)	548061	181168
D11	23 Bayliss Avenue (residential)	547843	180796
D12	140 Norman Road (residential)	549599	179643
D13	30 Poppy Close Belvedere (residential)	549797	179600
D14	1 Beltwood Road Belvedere (residential)	550102	178997
D15	4 Ashburnham Road Belvedere (residential)	550260	178956
D16	50 Battle Road Erith (residential)	550486	178851
D17	51 Lower Road Erith (residential)	550713	178807
D18	32 Galleon Close Erith (residential)	550962	178758
D19	116 Chandlers Drive Erith (residential)	551072	178622
D20	H Smith Food Group	551456	180684
D21	Quantum Group	551437	180778
D22	The EA MMF10 [a]	551338	180903
D23	Thermit Welding on Ferry Lane	551364	180936
D24	TotalFood Distribution Ltd	551284	181110
D25	Shanks Municipal waste Management	551128	180942
D26	Footpath	551483	181022

Note:

(a) This is the location of the mobile monitoring facility (MMF10) for monitoring PM10 concentrations by the EA between 1 April 2017 and 16 August 2017.

Figure 5-1. Sensitive Receptor Locations for the Protection of Human Health

Cartesian Grid Receptor

Cartesian receptor grids were used in the model in order to produce the concentration contour lines. The Cartesian receptor grid consists of receptors identified by their x (east-west) and y (north-south) coordinates. A fine grid was constructed with grid spacing (x, y) of 50m x 50m over an area covering 2000m by 2000m with south-west corner UK NGR (m) of 550200, 179800. A second grid was constructed with grid spacing (x, y) of 100m x 100m over an area covering 5000m by 5000m with south-west corner UK NGR (m) of 548400, 178200.

Ecological Receptors

IAQM guidance within 'A guide to the assessment of air quality impacts on designated nature conservation sites, May 2020' states the following:

> *"This IAQM guidance is applicable to the assessment of European, national and local designated sites where such assessments are required by the decision maker. This guidance, therefore, applies to the assessment of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) (known as European sites) and Ramsar sites which are covered by the Habitats Regulations. It also applies to Sites of Special Scientific Interest (SSSIs), Areas of Special Scientific Interest (ASSIs), National Nature Reserves (NNRs), local nature reserves (LNRs), local*

wildlife sites (LWSs) and areas of ancient woodland (AW)3. All these sites may require assessment depending on the type of project and/or the regulatory system under which the application is made. In this document, these are referred to as 'designated sites'".

Guidance in 'Air emissions risk assessment for your environmental permit' (Defra and Environment Agency, 2 August 2016) states that assessments should consider the impact on the conservation areas, as follows:

"Examining if there are any of the following within 10km of your site (or within 15km for coal or oil-fired power stations):

- *special protection areas (SPAs);*
- *special areas of conservation (SACs); and*
- *Ramsar sites (protected wetlands).*

Examining if there are any of the following within 2km of your site:

- *sites of special scientific interest (SSSIs); and*
- *local nature sites (ancient woods, local wildlife sites and national and local nature reserves).*

Some larger (greater than 50 megawatt) emitters may be required to screen to 15km for European sites and to 10km or 15km for SSSIs. Relevant screening distances should be discussed at pre-application."

Following a review the ecological sites below were identified.

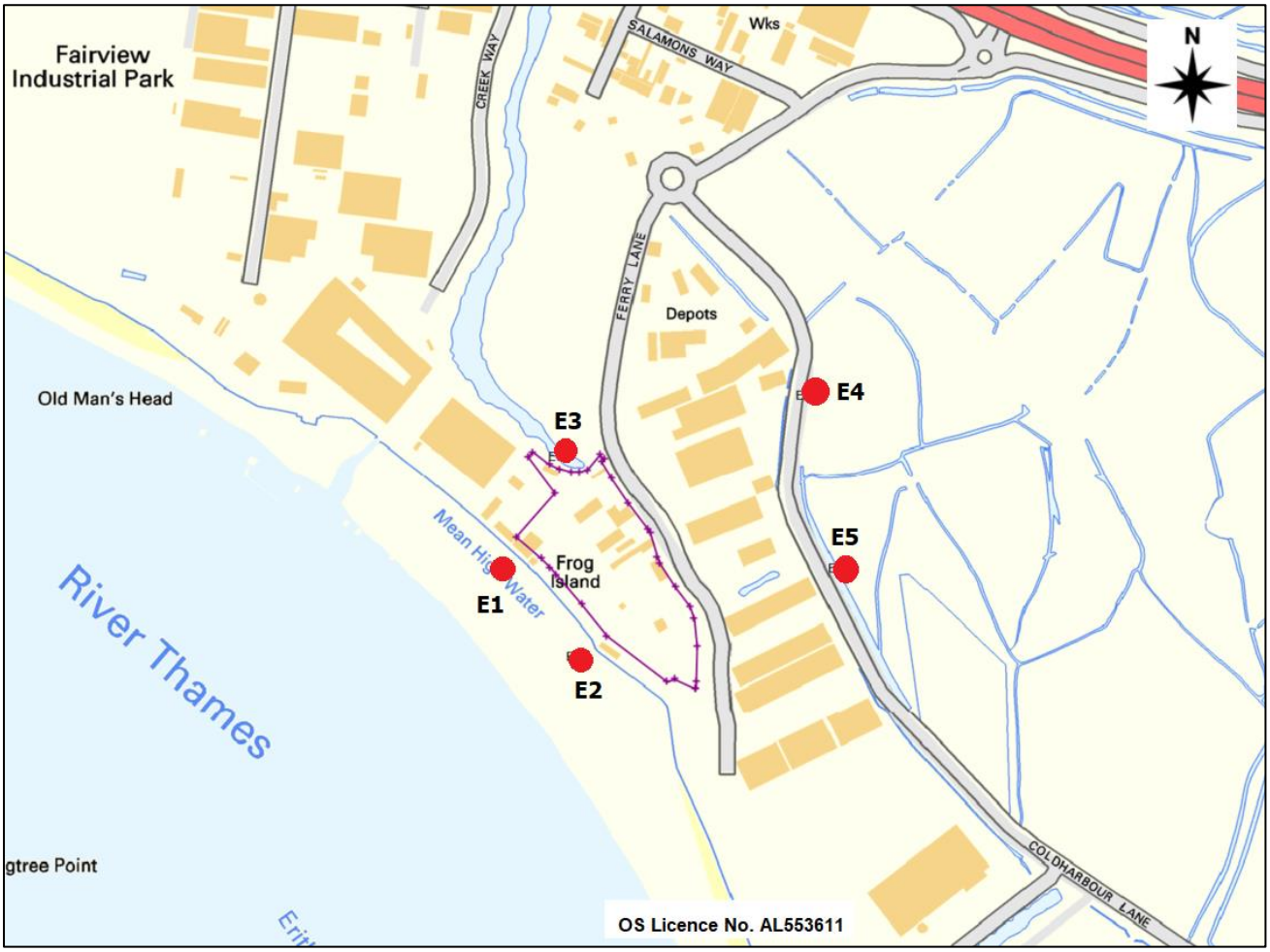
- River Thames SINC/Tidal Tributaries SINC. This SINC includes the River Thames immediately to the south of the Site, and also the tidal part of the Ingrebourne River to the north of the Site. The SINC is declared as a "site of metropolitan importance".
- Rainham Marshes (Local Nature Reserve). This is located approximately 150 m east/northeast of the Site at its closest point. The reserve is home to a diverse range of bird species, wetland plants and insects. It also has one of the densest water vole populations in the country.
- Inner Thames Marshes SSSI. This is located approximately 150 m east/northeast of the Site at its closest point. The SSSI site includes the habitat of neutral grassland lowland at Rainham Rifle ranges and the habitat of littoral sediment at the PLA silt Lagoons. The north-west section of the SSSI is overlapped with the Rainham Marshes LNR.

The identified ecological receptors are presented in **Table 5-3** and **Figure 5-3**, below.

Table 5-3. Ecological Receptor Locations

Discrete Sensitive Receptor		UK NGR (m)		Distance from Site (m)
		X	Y	
E1	River Thames SINC	551122	180879	0
E2	River Thames SINC	551206	180781	0
E3	Tidal Tributaries SINC	551185	181002	0
E4	Rainham Marshes (LNR) / Inner Thames Mashes (SSSI)	551458	181069	200
E5	Rainham Marshes (LNR) / Inner Thames Mashes (SSSI)	551493	180879	170

Figure 5-2. Ecological Receptor Locations



Particulate Matter Impact on Ecological Receptors

Technical Guidance Note M17 provides the guideline limits for non-toxic dust effects on ecological receptors and states the following:

> *"The effects of general, non-toxic particulate matter on ecological receptors have not been subject to extensive research and therefore little published guidance is available. A summary of a review of available research on behalf of the DETR concluded that: "The issue of dust on ecological receptors is largely confined to the associated chemical effect of dust, and particularly the effect*

of acidic or alkaline dust influencing vegetation through soils." Monitoring of the chemical species in dusts, and the guideline limits that apply, are covered later in Section 5.5.1 (of the Note M17); the summary below concerns guideline limits for general, non-toxic particulate matter on ecological receptors.

Our interim guidance (the EA's interim guidance) concluded that most relatively insensitive vegetation species will not be significantly affected by smothering at dust deposition levels below about 200 mg m-2 day -1 , i.e. the human nuisance custom and practice guideline. The report concluded there were insufficient data to derive thresholds for impacts of dust on invertebrates. The Highways Agency in its Design Manual for Roads and Bridges suggests that only dust deposition levels above 1000 mg m-2 day-1 are likely to affect sensitive ecological receptors and states that most species appear to be unaffected until dust deposition rates are at levels considerably higher than this."

There is no published guidance available that provides long-term and short-term threshold or critical levels in the assessment of the effects of suspended particulate matter (PM_{10} or $PM_{2.5}$) on ecological receptors.

Suspended particulate matter will be dispersed away in the air from the sources and the generated particulate matter is unlikely to result in a particulate deposition level above 1000 mg m-2 day-1 at any identified ecological receptors at the River Thames SINC/Tidal Tributaries SINC, Rainham Marshes LNR, and Inner Thames Marshes SSSI.

Therefore, the significance of the particulate matter impact on the ecological sites is considered to be 'negligible'.

5.3 HOURS OF OPERATIONS AND SITE ACTIVITIES

The site activities and recycling operations are planned as below:

- Monday to Friday: 06:00 to 18:00 Hours; Saturdays: 06:00 to 12:00 hours; and Sundays and Public Holidays: Not operational.
- The number of HGVs is estimated to be 150 HGV movements (75 in / 75 out) per day (equivalent to movement of 209,000 tonnes per annum and an average payload of 17 tonnes per vehicle and all vehicles will be required to meet Euro VI emission standards (Source: Transport Statement, July 2022, Reference: JPH/201201/D2).
- There are two 360 tracked excavators on site. For this assessment it has been assumed that the two excavators will be in operation simultaneously to produce a worst-case assessment. Each of the two 360 tracked excavators will be in operation 8 hours per day;
- There will be one loading shovel on the site. The loading activities will be completed in 4 hours with an average of 1,000 tonnes of waste a day.
- There are two screeners on site. For this assessment it has been assumed the two screeners will be in operation simultaneously for producing a worst-case assessment. Each of the two screeners will be in operation 9 hours per day.
- There is one crusher on site. The crusher will be in operation for 9 hours per day.

5.4 EMISSION SOURCE

PM_{10} emissions occur at several points/areas in the recycling and storage cycle, such as material loading/unloading, screening, crushing, disturbances by strong wind current, and loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of PM_{10}.

The modelled particulate matter emission sources from the site activities have been identified as:

- Particulate matter emission from site surfaces from the moving vehicles/HGVs;
- HGVs/Trucks loading and unloading of waste material;
- Particulate matter emission from site surfaces from the moving loading shovel; and
- Treatment of waste by crushing and screening. Wind whipping of material stored in stockpiles and other surface area; and
- Exhaust emissions.

The particulate matter emission calculations accounted for the site production levels, the number of equipment, and the type of material processed and emission controls, if any. The emission rates were determined based on the operations vehicle travels on the site and on the activities of aggregate handling and storage piles. The emission factors were determined using the methodology found in Section 13.2.1 of paved roads and Section of 13.2.4 of aggregate handling and storage piles of EPA's AP-42.

5.5 ASSESSMENT SCENARIOS

For particulate matter, two emission scenarios have been assessed; (1) Scenario 1 - using the typical or average values of the emission factors for the site activities and operation conditions, and (2) Scenario 2 - using the maximum or worst-case values of the emission factors for the site activities and operation conditions. The differences between the two scenarios are as follows:

- An average wind speed of 4.09 m/s has been for Scenario 1, with a higher wind speed of 7.7 m/s (at 95%ile of 2019 wind speed) for Scenario 2;
- Material moisture content of 14% for Scenario 1 and 8.9% for Scenario 2; and
- A higher silt content in recycling materials will result a higher particulate emission rate. The silt content and loading values for the paved road surface for Scenario 1 is 8.2 g/m^2, compared to 14.0 g/m^2 for Scenario 2.

5.6 PARTICULATE MATTER EMISSION RATE CALCULATION

The details of the particulate matter emission rates for Scenario 1 have been calculated and the mass emissions used within AERMOD are presented in **Table 5-4**.

The details of the particulate matter emission rates for Scenario 2 have been calculated and the mass emissions used within AERMOD are presented in **Table 5-5**.

Table 5-4. Particulate Matter Emissions for the Assessment - Scenario 1

Parameter	Emission Rates	Unit
Inert and excavation waste treatment (outdoor) - throughput	209,000	tpa
Hours of operation (Weekdays)	12	Hr/day
Hours of operation (Saturdays)	6	Hr/day
Hours of loading operation	4	Hr/a day
Hours of Crushing operation	9	Hr/ a day
Hours of screening operation	9	Hr/ a day
Working days	Monday to Friday; Saturday	-
Truck/HGV vehicles	150 (75 in and 75 out)	Vehicles/day
Stockpile Height	3	m
(1) PM_{10} emission from the HGVs/Trucks unloading of waste (drop operations)		
Waste/clay unloading per hour	83	t/hr
k - particle size multiplier (dimensionless)	0.35	-
U - mean wind speed, meter per second (2019 London airport mean wind speed)	4.09	m/s
M = material moisture content % (for clay/dirt mix)	14	%
E - Emission factor	0.0823	g/t
PM_{10} Emission rate	0.0019	g/s
(2) PM_{10} emission from shovel loading waste onto the Truck/lorry		
Waste/clay loading per hour	333	t/hr
k - particle size multiplier (dimensionless)	0.35	-
U - mean wind speed, meter per second (2019 London airport mean wind speed)	4.09	m/s
M = material moisture content % (for clay/dirt mix)	14	%
E - Emission factor	0.0823	g/t
PM_{10} Emission rate	0.0076	g/s
(3) PM_{10} emission from site surfaces from the moving vehicles – HGVs		
(3a). Particulate emission from resuspended road surface material		
W = mean vehicle weight (tons)	26.00	t
sL = road surface silt loading (grams per square meter) (Quarry industry)	8.2	g/m^2
P - number of hours with >0.25 mm (0.01 in.) of precipitation per year (2019 London airport Met data)	893	hr
E = particulate emission factor	102.46	g/VKT (VKT = vehicle kilometre travelled)
(3b). Particulate emission from vehicle exhaust and tire wear		
PM_{10} from HGV/truck exhaust and tire wear	0.1325	g/VKT
(3c). HGV Vehicle travel distance on the site		
Total HGV distance travelled on the site per day	8.625	Km/day

Parameter	Emission Rates	Unit
HGV PM_{10} emission rate from the moving vehicles	0.020457	g/s
HGV PM_{10} emission rate from the exhaust and tire	0.000026	g/s
Total HGV PM_{10} emission rate from the moving vehicles/HGVs	0.020483	g/s
(4) PM_{10} emission from site surfaces from the moving vehicles-Loading shovel		
(4a). Particulate emission from resuspended road surface material		
W = mean vehicle weight (tons)	19.92	t
sL = road surface silt loading (grams per square meter) (Quarry industry)	8.9	g/m^2
P – number of hours with >0.25 mm (0.01 in.) of precipitation per year (2016 London airport Met data)	893	hr
E = particulate emission factor	78.07	g/VKT (VKT = vehicle kilometre travelled)
(4b). Particulate emission from vehicle exhaust and tire wear		
PM_{10} from loading shovel exhaust and tire wear	0.1325	g/VKT
(4c). Shovel travel distance on the site		
Total shovel distance travelled on the site per day	6.17	km/day
Shovel PM_{10} emission rate from the moving vehicles	0.0585	g/s
Shovel PM_{10} emission rate from the exhaust and tire	0.00008	g/s
Total Shovel PM_{10} emission rate from the moving vehicles – Loading Shovel	0.05862	g/s
(5) PM_{10} emission from Stockpiles		
Uncontrolled PM_{10} emission rates in pounds per day per acre from material surge and stockpiles due to wind erosion have been estimated by application of Equation (4-9) from EPA-450/3-88-008 Section 2.1.2, "Control of Open Fugitive Dust Sources", and the conversion factor of 0.5 PM_{10}/TSP (from the same document)		
s - silt content of aggregate, % (for clay/dirt mix)	9.2	%
P - number days with >0.25 mm (0.01 in.) of precipitation per year (2019 London airport met data)	178	Days/year
E - Emission Rate	13.40	lbs/TSP/day/acre
E - Emission Rate	1.502203	$g/TSP/day/m^2$
Area of materials Handing Area No.1	2195	m^2
Emission rate from stockpile - wind erosion	0.0000087	$g/m^2/s$
Mass emission rate	0.019	g/s
Area of materials Handing Area No.2	184	m^2
Emission rate from stockpile - wind erosion	0.0000087	$g/m^2/s$
Mass emission rate	0.002	g/s
Storage bays area stockpile	962	m^2
Emission rate from stockpile - wind erosion	0.0000087	$g/m^2/s$
Mass emission rate	0.008	g/s
(6) PM_{10} emission from Crushing – per Crusher		
Controlled emission factor from Primary, Secondary and Tertiary Crushing, which incorporates emissions from transfer of material to the crusher and transfer of material from the crusher.	0.00054	Pounds per tonne
Crusher capacity	100	Tonnes/hr

Parameter	Emission Rates	Unit
Operating hours	9	hours
Emission rate	0.00680	g/s
(7) PM_{10} emission from Screening – per Screener		
Controlled emission factor from screening, which incorporates emissions from transfer of material to the screen.	0.00074	Pounds per tonne
Screener capacity	111	Tonnes/hr
Operating hours	9	hours
Emission rate	0.01178	g/s
(8) PM_{10} emission from the 360 tracked excavator – per excavator		
Assuming the same PM_{10} emission rate as the truck unloading	0.0019	g/s

Table 5-5. Particulate Matter Emissions for the Assessment - Scenario 2

Parameter	Emission Rates	Unit
Inert and excavation waste treatment (outdoor) - throughput	209,000	tpa
Hours of operation (Weekdays)	12	Hr/day
Hours of operation (Saturdays)	6	Hr/day
Hours of loading operation	4	Hr/a day
Hours of Crushing operation	9	Hr/ a day
Hours of screening operation	9	Hr/ a day
Working days	Monday to Friday; Saturday	-
Truck/HGV vehicles	150 (75 in and 75 out)	Vehicles/day
Stockpile Height	3	m
(1) PM_{10} emission from the HGVs/Trucks unloading of waste within the MHA (drop operations)		
Waste/clay unloading per hour	83	t/hr
k - particle size multiplier (dimensionless)	0.35	-
U - mean wind speed, meter per second (2019 London airport mean wind speed at 95%ile)	7.70	m/s
M = material moisture content % (for clay/dirt mix)	8.9	%
E - Emission factor	0.1551	g/t
PM_{10} Emission rate	0.0082	g/s
(2) PM_{10} emission from shovel loading waste onto the Trucks		
Waste/clay loading per hour	333	t/hr
k - particle size multiplier (dimensionless)	0.35	-
U - mean wind speed, meter per second (2019 London airport mean wind speed at 95%ile)	7.70	m/s
M = material moisture content % (for clay/dirt mix)	8.9	%
E - Emission factor	0.3530	g/t
PM_{10} Emission rate	0.0327	g/s
(3) PM_{10} emission from site surfaces from the moving vehicles - HGVs		
(3a). Particulate emission from resuspended road surface material		

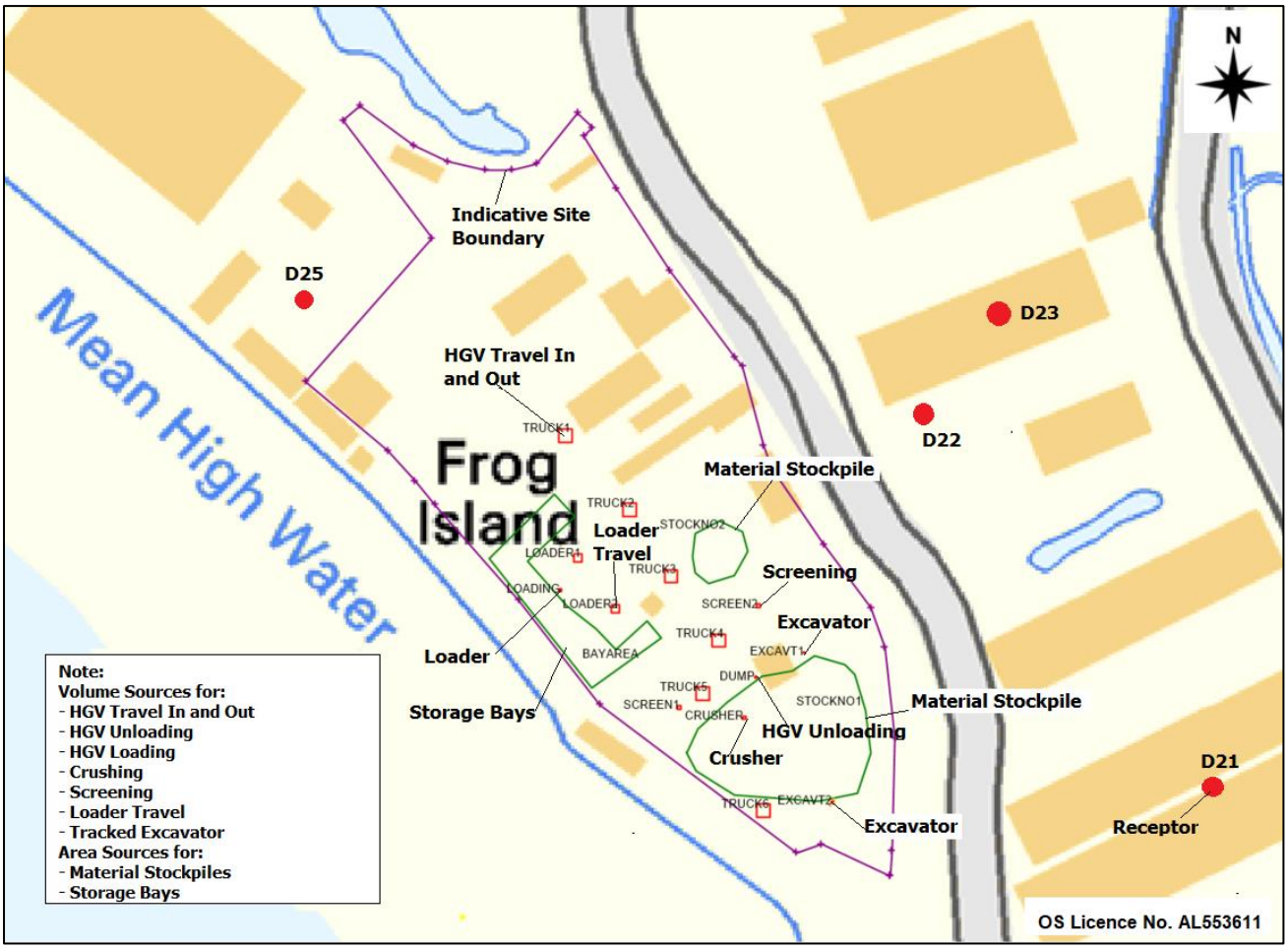
Parameter	Emission Rates	Unit
W = mean vehicle weight (tons)	26.00	t
sL = road surface silt loading (grams per square meter) (Quarry industry)	14	g/m^2
P – number of hours with >0.25 mm (0.01 in.) of precipitation per year (2016 London airport Met data)	893	hr
E = particulate emission factor	166.71	g/VKT (VKT = vehicle kilometre travelled)
(3b). Particulate emission from vehicle exhaust and tire wear		
PM_{10} from HGV/truck exhaust and tire wear	0.1325	g/VKT
(3c). HGV Vehicle travel distance on the site		
Total HGV distance travelled on the site per day	8.625	Km/day
HGV PM_{10} emission rate from the moving vehicles	0.033285	g/s
HGV PM_{10} emission rate from the exhaust and tire	0.000026	g/s
Total HGV PM_{10} emission rate from the moving vehicles/HGVs	0.033311	g/s
(4) PM_{10} emission from site surfaces from the moving vehicles- Loading shovel		
(4a). Particulate emission from resuspended road surface material		
W = mean vehicle weight (tons)	19.92	t
sL = road surface silt loading (grams per square meter) (Quarry industry)	14.0	g/m^2
P – number of hours with >0.25 mm (0.01 in.) of precipitation per year (2016 London airport Met data)	893	hr
E = particulate emission factor	127.02	g/VKT (VKT = vehicle kilometre travelled)
(4b). Particulate emission from vehicle exhaust and tire wear		
PM_{10} from loading shovel exhaust and tire wear	0.1325	g/VKT
(4c). Shovel travel distance on the site		
Total shovel distance travelled on the site per day	6.17	km/day
Shovel PM_{10} emission rate from the moving vehicles	0.1429	g/s
Shovel PM_{10} emission rate from the exhaust and tire	0.00011	g/s
Total Shovel PM_{10} emission rate from the moving vehicles – Loading Shovel	0.14299	g/s
(5) PM_{10} emission from Stockpiles		
Uncontrolled PM_{10} emission rates in pounds per day per acre from material surge and stockpiles due to wind erosion will be estimated by application of Equation (4-9) from EPA-450/3-88-008 Section 2.1.2, “Control of Open Fugitive Dust Sources”, and the conversion factor of 0.5 PM_{10}/TSP (from the same document)		
s – silt content of aggregate, % (for clay/dirt mix)	9.2	%
P – number days with >0.25 mm (0.01 in.) of precipitation per year (2016 London airport met data)	178	Days/year
E - Emission Rate	13.40	lbs/TSP/day/acre
E - Emission Rate	1.502203	$g/TSP/day/m^2$
Area of materials Handing Area No.1	2195	m^2
Emission rate from stockpile – wind erosion	0.0000087	$g/m^2/s$
Mass emission rate	0.019	g/s

Parameter	Emission Rates	Unit
Area of materials Handing Area No.2	184	m^2
Emission rate from stockpile – wind erosion	0.0000087	$g/m^2/s$
Mass emission rate	0.002	g/s
Storage bays area stockpile	962	m^2
Emission rate from stockpile – wind erosion	0.0000087	$g/m^2/s$
Mass emission rate	0.008	g/s
(6) PM10 emission from Crushing – per Crusher		
Controlled emission factor from Primary, Secondary and Tertiary Crushing, which incorporates emissions from transfer of material to the crusher and transfer of material from the crusher.	0.00054	Pounds per tonne
Crusher capacity	150	Tonnes/hr
Operating hours	9	hours
Emission rate	0.01021	g/s
(7) PM10 emission from Screening – per Screener		
Controlled emission factor from screening, which incorporates emissions from transfer of material to the screen.	0.00074	Pounds per tonne
Screener capacity	139	Tonnes/hr
Operating hours	9	hours
Emission rate	0.01472	g/s
(8) PM_{10} emission from the 360 tracked excavator – per excavator		
Assuming the same PM_{10} emission rate as the truck unloading	0.0082	g/s

The emission sources of HGVs/Trucks unloading, shovel loading/tracked excavator, moving vehicles/HGVs, moving loading shovel, crushing, screening, and the tracked excavator, have been modelled as volume sources in accordance with the EPA's Guidance. The wind whipping of material stored in stockpiles and other surface areas has been modelled as an area source following the EPA's Guidance.

The locations of the modelled emission sources are illustrated in **Figure 5-3**.

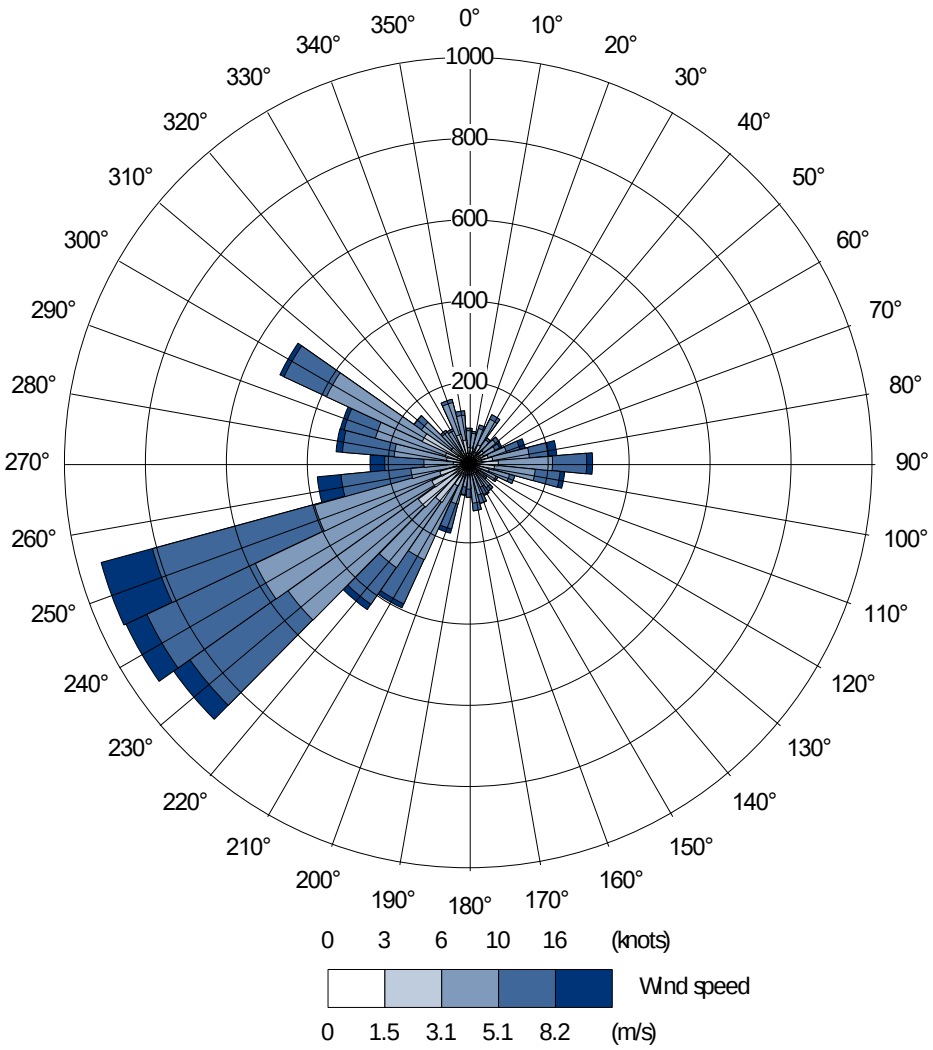
Figure 5-3. Emission Source Locations



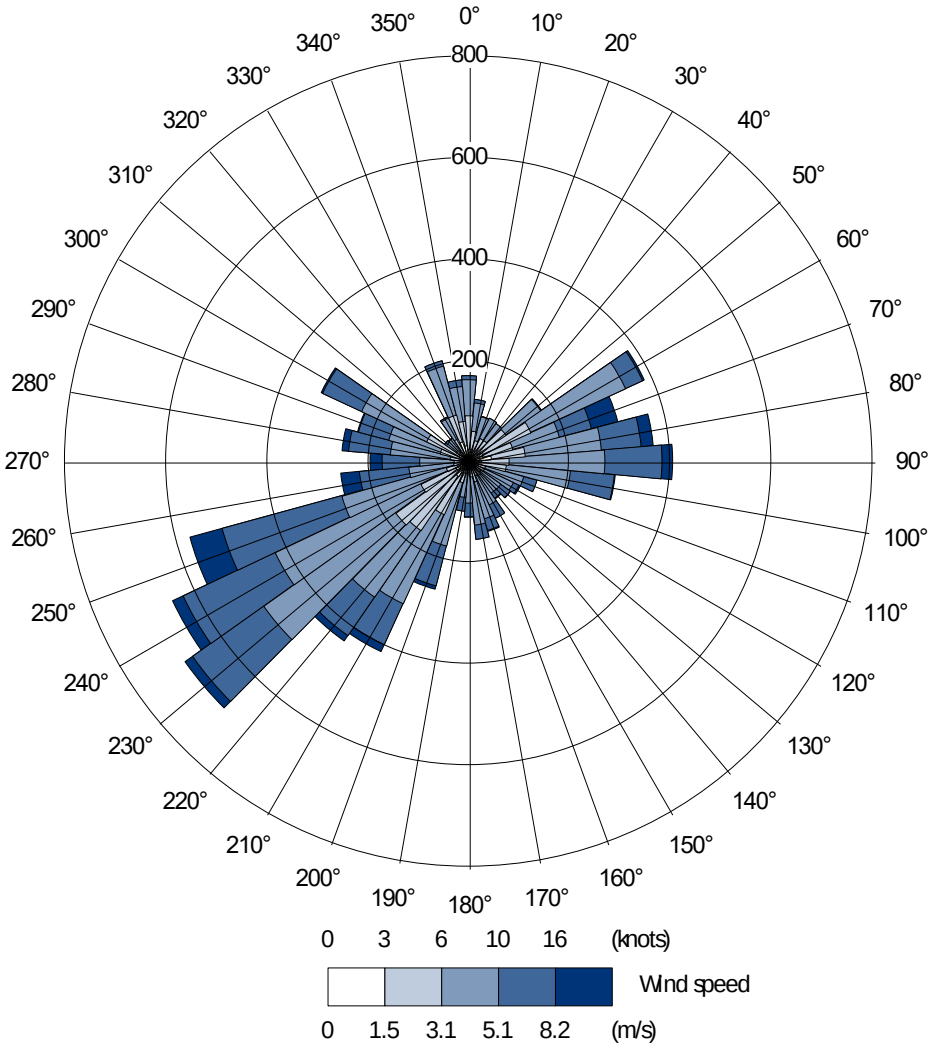
5.7 METEOROLOGICAL DATA

The 3-year meteorological data used in the assessment is derived from London Airport weather station, which is considered representative of conditions within the vicinity of the site, with all the complete parameters necessary for the AERMOD model. Reference should be made to **Figure 5-4** for an illustration of the prevalent wind conditions at the London Airport weather station.

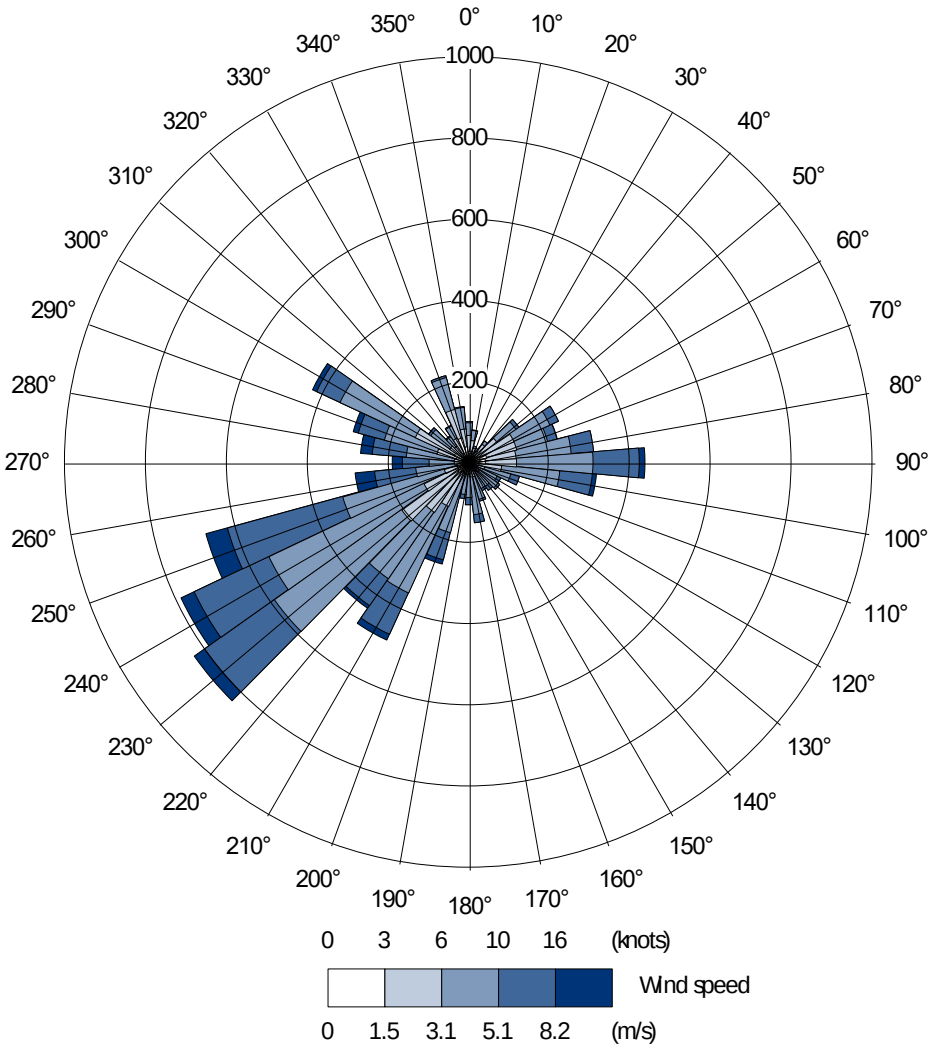
Figure 5-4. London Airport Meteorological Station Wind Rose



London_City_18.met



London_City_19.met



5.8 SURFACE CHARACTERISTICS

The land uses surrounding the site are described as 'city'. A surface roughness value of 1.0 m for the sites has been used in the modelling as it is considered that it is representative of the characteristics of the area surrounding the site.

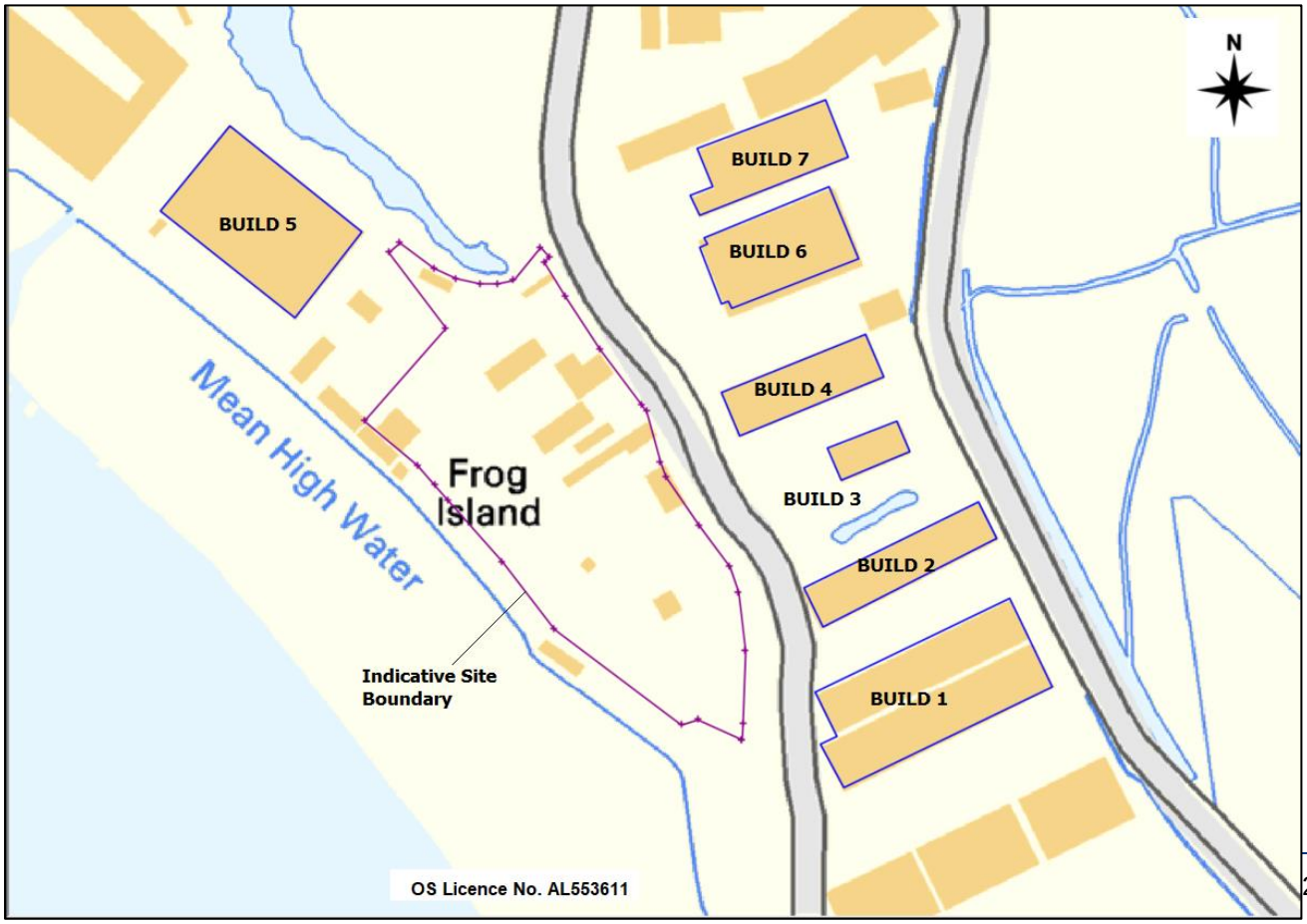
5.9 BUILDINGS IN THE MODELLING ASSESSMENT

Buildings nearby or immediately adjacent to the emission sources could potentially cause building downwash effects on emission sources and have therefore been modelled. The locations and dimensions of the buildings used in the model are given in **Table 5-6** and illustrated in **Figure 5-5**.

Table 5-6. Locations and Heights of Buildings Used in the Model

Name		UK NGR (m)		Height (m)
		X	Y	
1	H Smith Food Group	551380	180722	6
2	Redec Industrial Ltd	551369	180806	6
3	White Eale Cars	551371	180899	16
4	Thermit Welding	551325	180906	7
5	Building to the NW	551128	181012	5
6	SG Tech Limited	551387	180998	9
7	WOW Glass	551304	181021	10

Figure 5-5. Buildings in the Model



5.10 TREATMENT OF TERRAIN

The presence of steep terrain can influence the dispersion of emissions and the resulting pollutant concentrations. USEPA guidance indicates that terrain effects should be considered if the gradient exceeds 1:10. Digital terrain files in the UK Ordnance Survey (OS) Landranger format (.NTF) have been used in the assessment.

5.11 MODELLING UNCERTAINTY

Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty – due to model limitations;
- Data uncertainty – including emissions estimates, background estimates and meteorology; and,
- Variability – randomness of measurements used.

However, potential uncertainties in model results have been minimised as far as practicable and worst-case inputs considered in order to provide a robust assessment. This included the following:

- Choice of model – AERMOD is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible;
- Plant operating parameters – Operational parameters were provided for the plant.
- Emission rates – Emissions were based on 24-hour operation, this is likely to overestimate impacts as periods of shut down have not been considered.
- Background concentrations – Background pollutant concentrations were obtained from a number of recognised sources in order to consider baseline levels in the vicinity of the site, as detailed within the main report text.
- Variability – All model inputs are as accurate as possible and worst-case conditions have been considered where necessary in order to ensure a robust assessment of potential pollutant concentrations.

6.0 DETAILED PM_{10} AND $PM_{2.5}$ MODELLING ASSESSMENT RESULTS

The detailed computational modelling assessment of process emissions was undertaken using the input parameters detailed in Section 5.

All predicted concentrations have been compared to the relevant environmental assessment criteria, as detailed in Sections 2 and 3.

6.1 SCENARIO 1 – TYPICAL OR AVERAGE VALUES OF THE EMISSION FACTORS

6.1.1 Long-Term (Annual Mean) PM_{10} – Scenario 1

The long-term emissions of PM_{10} from the source considered were assessed for all 3 years of meteorological data. The maximum PECs are compared against the relevant AQS, in **Table 6-1**. The maximum PECs of long-term PM_{10} for the 3 years of meteorological data assessed do not exceed the relevant AQS, at any receptor locations. From the meteorological dataset, the year resulting in maximum long-term PM_{10} concentration was identified as 2019.

The highest long-term PEC of PM_{10} when using 2019 meteorological data is 17.26 µg/m^3. This occurs at the receptor location of the EA MMF10 (D22) (approximately 50m east of the eastern boundary). The PEC is below the relevant long-term AQS of 40 µg/m^3 for the protection of human health.

Table 6-1. The Maximum Long-Term (Annual Mean) Concentrations of PM_{10}

Pollutant	Year	Process Contrib'tn (PC)	PC as %age of AQO	Background from the Traffic assessment	PEC[a] (PC +Background)	Easting (m)	Northing (m)	Receptor Name
PM_{10}	2017	1.25	3.11	15.84	17.09	551337	180903	The EA MMF10 (D22)
PM_{10}	2018	1.31	3.28	15.84	17.15	551337	180903	The EA MMF10 (D22)
PM_{10}	2019	1.42	3.55	15.84	17.26	551337	180903	The EA MMF10 (D22)
AQOs	40							

Note:

a. *Inclusive of Background concentration from the traffic assessment.*

Table 6-2 presents a summary of the predicted PM_{10} concentrations, both PCs and PECs, at the modelled receptors locations.

The significance of changes associated with the operations of the plant with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-2**.

Table 6-2. The Long-Term (Annual Mean) Concentrations of PM_{10} and Impact Description of Effects at Receptors

Receptor		Predicted Annual Mean Concentration (µg/m³) – 2019 Met Data, and PM_{10} Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D1	8 Manstead Gardens Rainham (residential)	0.01	0.03	18.80	18.81	47.03	≤ 75 of AQO	Negligible
D2	6 River Close Rainham (residential)	0.01	0.04	18.63	18.64	46.61	≤ 75 of AQO	Negligible
D3	56 Elizabeth Road (residential)	0.02	0.04	18.49	18.51	46.27	≤ 75 of AQO	Negligible
D4	15 Palliser Drive Rainham (residential)	0.02	0.04	18.42	18.44	46.09	≤ 75 of AQO	Negligible
D5	21 Broadway, Rainham (residential)	0.01	0.03	17.78	17.79	44.48	≤ 75 of AQO	Negligible
D6	Flat 49 Dunedin Road (residential)	0.01	0.01	17.93	17.94	44.84	≤ 75 of AQO	Negligible
D7	2a Phillip Road (residential)	0.004	0.01	17.79	17.79	44.48	<76 of AQO	Negligible
D8	107 New Road (residential)	0.003	0.01	19.14	19.14	47.86	≤ 75 of AQO	Negligible
D9	162 Oval Road South Dagenham	0.002	0.00	17.35	17.35	43.38	≤ 75 of AQO	Negligible
D10	16 Sunningdale close London (residential)	0.003	0.01	17.26	17.26	43.16	≤ 75 of AQO	Negligible
D11	23 Bayliss Avenue (residential)	0.003	0.01	17.89	17.89	44.73	≤ 75 of AQO	Negligible
D12	140 Norman Road (residential)	0.00	0.01	17.06	17.06	42.66	≤ 75 of AQO	Negligible
D13	30 Poppy Close Belvedere (residential)	0.01	0.01	17.06	17.07	42.66	≤ 75 of AQO	Negligible
D14	1 Beltwood Road Belvedere (residential)	0.003	0.01	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D15	4 Ashburnham Road Belvedere (residential)	0.003	0.01	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D16	50 Battle Road Erith (residential)	0.003	0.01	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D17	51 Lower Road Erith (residential)	0.003	0.01	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D18	32 Galleon Close Erith (residential)	0.004	0.01	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D19	116 Chandlers Drive Erith (residential)	0.004	0.01	16.05	16.05	40.13	≤ 75 of AQO	Negligible
D20	H Smith Food Group	0.34	0.85	15.78	16.12	40.30	≤ 75 of AQO	Negligible
D21	Quantum Group	0.66	1.65	15.80	16.46	41.15	≤ 75 of AQO	Negligible
D22	The EA MMF10 [a]	1.42	3.55	15.84	17.26	43.15	≤ 75 of AQO	Negligible
D23	Thermit Welding on Ferry Lane	0.84	2.10	15.86	16.70	41.75	≤ 75 of AQO	Negligible

Receptor		Predicted Annual Mean Concentration (µg/m^3) – 2019 Met Data, and PM_{10} Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D24	TotalFood Distribution Ltd	0.21	0.54	18.09	18.30	45.76	≤ 75 of AQO	Negligible
D25	Shanks Municipal waste Management	0.65	1.63	15.83	16.48	41.20	≤ 75 of AQO	Negligible
D26	Footpath	0.29	0.74	17.98	18.27	45.69	≤ 75 of AQO	Negligible
AQO		**40 µg/m^3**						

The % change in process concentrations relative to the AQAL as a result of the plant operations at all receptor locations, with respect to PM_{10} exposure, are determined to be 3.55% or less. The significance is determined to be 'negligible' based on the methodology outlined in Section 3.

Therefore, the predicted long-term PM_{10} concentrations from the Site are considered acceptable for the protection of human health.

6.1.2 Short-Term (annual Mean) PM_{10} – Scenario 1

The short-term emissions of PM_{10} from the sources considered were assessed for all 3 years of meteorological data. The maximum PECs are compared against the relevant AQS, in **Table 6-3**.

Table 6-3. The Maximum Predicted 24-hour Mean (the 90.41th Percentile) Concentration of PM_{10} (µg/m^3)

Pollutant	Year	Process Contrib'tn (PC)	PC as %age of AQO	Background from the Traffic assessment	PEC[(a)] (PC +Background)	Easting (m)	Northing (m)	Receptor Name
PM10	2017	2.10	4.19	15.84	17.94	551337	180903	The EA MMF10 (D22)
PM10	2018	2.39	4.78	15.84	18.23	551337	180903	The EA MMF10 (D22)
PM10	2019	2.58	5.16	15.84	18.42	551337	180903	The EA MMF10 (D22)
AQOs	50							

Note:

a. *Inclusive of Background concentration from the traffic assessment.*

The maximum PECs of short-term PM_{10} for the 3 years of meteorological data assessed do not exceed the relevant AQS, at any receptor locations. From the meteorological dataset, the year resulting in maximum short-term PM_{10} concentration was identified as 2019.

The highest short-term PEC of PM_{10} when using 2019 meteorological data is 18.42 µg/m^3. This occurs at the receptor location of the EA MMF10 (D22) (approximately 50m east of the eastern boundary). The PEC is below the relevant short-term AQS of 50 µg/m^3 for the protection of human health

The short-term PM_{10} PEC concentrations have been calculated at each of the discrete receptors listed for the worst meteorological year of 2019 and these results are detailed in **Table 6-4**.

Table 6-4. The Predicted 24-hour Mean (the 90.41th Percentile) Concentrations of PM_{10} at Receptors

Receptor		Predicted 24-hour Mean (90.41th Percentile) Concentration (µg/m3) – 2019 Met Data					
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	Impact Descriptor [1]
D1	8 Manstead Gardens Rainham (residential)	0.029	0.059	18.80	18.83	37.66	Negligible
D2	6 River Close Rainham (residential)	0.036	0.072	18.63	18.67	37.33	Negligible
D3	56 Elizabeth Road (residential)	0.040	0.081	18.49	18.53	37.06	Negligible
D4	15 Palliser Drive Rainham (residential)	0.037	0.073	18.42	18.46	36.91	Negligible
D5	21 Broadway, Rainham (residential)	0.028	0.056	17.78	17.81	35.62	Negligible
D6	Flat 49 Dunedin Road (residential)	0.013	0.026	17.93	17.94	35.89	Negligible
D7	2a Phillip Road (residential)	0.010	0.021	17.79	17.80	35.60	Negligible
D8	107 New Road (residential)	0.009	0.018	19.14	19.15	38.30	Negligible
D9	162 Oval Road South Dagenham	0.006	0.011	17.35	17.36	34.71	Negligible
D10	16 Sunningdale close London (residential)	0.010	0.019	17.26	17.27	34.54	Negligible
D11	23 Bayliss Avenue (residential)	0.009	0.018	17.89	17.90	35.80	Negligible
D12	140 Norman Road (residential)	0.014	0.028	17.06	17.07	34.15	Negligible
D13	30 Poppy Close Belvedere (residential)	0.015	0.030	17.06	17.07	34.15	Negligible
D14	1 Beltwood Road Belvedere (residential)	0.008	0.016	17.13	17.14	34.28	Negligible
D15	4 Ashburnham Road Belvedere (residential)	0.008	0.016	17.13	17.14	34.28	Negligible
D16	50 Battle Road Erith (residential)	0.009	0.017	17.13	17.14	34.28	Negligible
D17	51 Lower Road Erith (residential)	0.010	0.019	17.13	17.14	34.28	Negligible
D18	32 Galleon Close Erith (residential)	0.009	0.019	17.13	17.14	34.28	Negligible
D19	116 Chandlers Drive Erith (residential)	0.010	0.020	16.05	16.06	32.12	Negligible
D20	H Smith Food Group	0.851	1.703	15.78	16.63	33.26	Negligible
D21	Quantum Group	1.321	2.643	15.80	17.12	34.24	Negligible
D22	The EA MMF10 [a]	2.582	5.164	15.84	18.42	36.84	Negligible
D23	Thermit Welding on Ferry Lane	1.615	3.230	15.86	17.48	34.95	Negligible
D24	TotalFood Distribution Ltd	0.455	0.911	18.09	18.55	37.09	Negligible
D25	Shanks Municipal waste Management	1.255	2.510	15.83	17.09	34.17	Negligible
D26	Footpath	0.621	1.242	17.98	18.60	37.20	Negligible
AQO		**50 µg/m3**					

Note 1. IAQM Guidance of "Land-Use Planning & Development Control: Planning For Air Quality, January 2017", states: "***6.39*** *Where such peak short-term concentrations from an elevated source are in the range 11-20% of the relevant AQAL, then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. That is not to say that background concentrations are unimportant, but they will, on an annual average basis, be a much smaller quantity than the peak concentration caused by a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration at a receptor. This approach is intended to be a streamlined and pragmatic assessment procedure that avoids undue complexity."*

From **Table 6-4**, it can be seen that the predicted short-term PCs of PM_{10} at discrete receptors range from 0.01 to 2.58 µg/m^3. There are no exceedances of the short-term PM_{10} AQS at any of the identified discrete receptors; indeed the predicted impacts are significantly below the AQS of 50 µg/m^3.

Therefore, the predicted short-term PM_{10} concentrations from the Site are considered acceptable for the protection of human health.

The contour plots of the predicted long-term and short-term ground level PCs of PM_{10} for all receptors, including discrete, boundary and grid receptors are presented in **Figure 6-1** and **Figure 6-2**. The contour plots show that the predicted maximum concentrations occur adjacent to the emission source, with a predicted decrease in concentration with the increased distance from the emission source.

Figure 6-1. Long-Term PM_{10} PC – Scenario 1

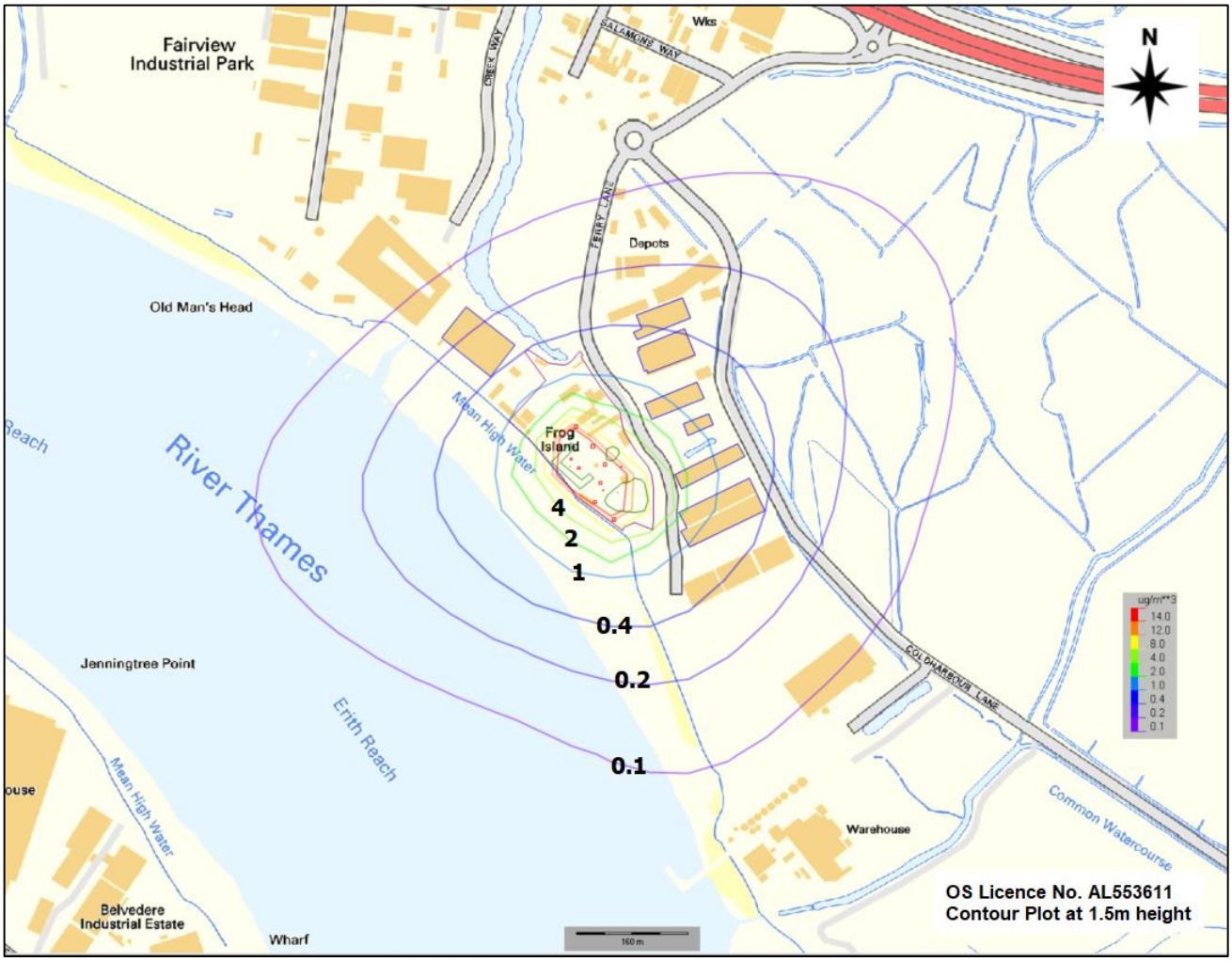
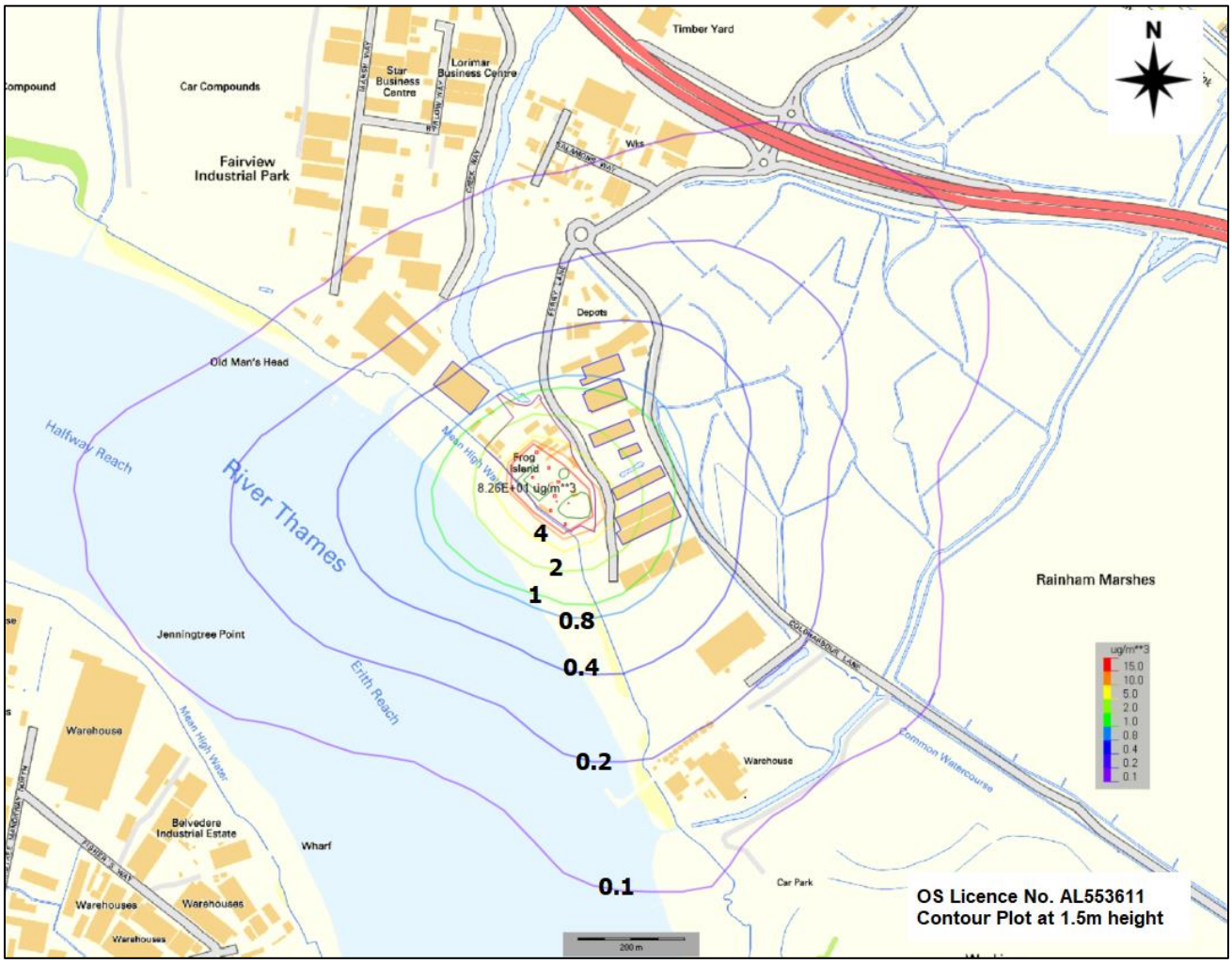


Figure 6-2. Short-Term (24-hour mean, 90.41th Percentile) PM_{10} PC – Scenario 1



6.1.3 Particulate Matter ($PM_{2.5}$) – Scenario 1

A worst-case scenario assumption of 100% of PM_{10} to be $PM_{2.5}$ has been made in the assessment. The predicted long-term PCs of $PM_{2.5}$ using 2019 met data and the significance of changes associated with the operations of the plant with respect to annual mean $PM_{2.5}$ exposure has been presented and assessed in **Table 6-5**.

Table 6-5. The Long-Term (Annual Mean) Concentrations of $PM_{2.5}$ and Impact Description of Effects at Receptors

Receptor		Predicted Annual Mean Concentration (µg/m³) – 2019 Met Data, and $PM_{2.5}$ Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D1	8 Manstead Gardens Rainham (residential)	0.01	0.06	12.32	12.33	61.66	≤ 75 of AQO	Negligible
D2	6 River Close Rainham (residential)	0.01	0.07	12.23	12.24	61.22	≤ 75 of AQO	Negligible
D3	56 Elizabeth Road (residential)	0.02	0.08	12.14	12.16	60.78	≤ 75 of AQO	Negligible
D4	15 Palliser Drive Rainham (residential)	0.02	0.08	12.10	12.12	60.58	≤ 75 of AQO	Negligible
D5	21 Broadway, Rainham (residential)	0.01	0.06	11.95	11.96	59.81	≤ 75 of AQO	Negligible
D6	Flat 49 Dunedin Road (residential)	0.01	0.03	12.04	12.05	60.23	≤ 75 of AQO	Negligible
D7	2a Phillip Road (residential)	0.00	0.02	11.96	11.96	59.82	<76 of AQO	Negligible
D8	107 New Road (residential)	0.003	0.02	12.75	12.75	63.77	≤ 75 of AQO	Negligible
D9	162 Oval Road South Dagenham	0.002	0.01	11.80	11.80	59.01	≤ 75 of AQO	Negligible
D10	16 Sunningdale close London (residential)	0.003	0.01	11.96	11.96	59.81	≤ 75 of AQO	Negligible
D11	23 Bayliss Avenue (residential)	0.003	0.02	12.08	12.08	60.42	≤ 75 of AQO	Negligible
D12	140 Norman Road (residential)	0.00	0.02	11.58	11.58	57.92	≤ 75 of AQO	Negligible
D13	30 Poppy Close Belvedere (residential)	0.01	0.03	11.58	11.59	57.93	≤ 75 of AQO	Negligible
D14	1 Beltwood Road Belvedere (residential)	0.003	0.01	11.73	11.73	58.66	≤ 75 of AQO	Negligible
D15	4 Ashburnham Road Belvedere (residential)	0.003	0.01	11.73	11.73	58.66	≤ 75 of AQO	Negligible
D16	50 Battle Road Erith (residential)	0.003	0.01	11.73	11.73	58.66	≤ 75 of AQO	Negligible
D17	51 Lower Road Erith (residential)	0.003	0.02	11.73	11.73	58.67	≤ 75 of AQO	Negligible
D18	32 Galleon Close Erith (residential)	0.00	0.02	11.73	11.73	58.67	≤ 75 of AQO	Negligible
D19	116 Chandlers Drive Erith (residential)	0.00	0.02	10.98	10.98	54.92	≤ 75 of AQO	Negligible
D20	H Smith Food Group	0.34	1.71	10.77	11.11	55.56	≤ 75 of AQO	Negligible
D21	Quantum Group	0.66	3.30	10.79	11.45	57.25	≤ 75 of AQO	Negligible
D22	The EA MMF10 [a]	1.42	7.10	10.81	12.23	61.15	≤ 75 of AQO	Slight
D23	Thermit Welding on Ferry Lane	0.84	4.19	10.82	11.66	58.29	≤ 75 of AQO	Negligible

Receptor		Predicted Annual Mean Concentration (µg/m^3) – 2019 Met Data, and $PM_{2.5}$ Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D24	TotalFood Distribution Ltd	0.21	1.07	12.01	12.22	61.12	≤ 75 of AQO	Negligible
D25	Shanks Municipal waste Management	0.65	3.26	10.81	11.46	57.31	≤ 75 of AQO	Negligible
D26	Footpath	0.29	1.47	11.94	12.23	61.17	≤ 75 of AQO	Negligible
AQO		**20 µg/m^3**						

The predicted long-term $PM_{2.5}$ concentrations at receptor locations are below the AQAL.

The percentage change in process concentrations relative to the AQAL as a result of the plant operations at all receptor locations, with respect to $PM_{2.5}$ exposure, are determined to be 7.10 % or less. The significance is determined to range from 'negligible' to 'slight. It should be noted that the assessment results were based on the assumption of 100% of PM_{10} to be $PM_{2.5}$.

Therefore, the predicted long-term $PM_{2.5}$ concentrations from the Site are considered acceptable for the protection of human health.

6.2 SCENARIO 2 – MAXIMUM OR WORST-CASE VALUES OF THE EMISSION FACTORS

6.2.1 Long-Term (Annual Mean) PM_{10} – Scenario 2

The long-term emissions of PM_{10} from the source considered were assessed for all 3 years of meteorological data. The maximum PECs are compared against the relevant AQS, in **Table 6-6**. The maximum PECs of long-term PM_{10} for the 3 years of meteorological data assessed do not exceed the relevant AQS, at any receptor locations. From the meteorological dataset, the year resulting in maximum long-term PM_{10} concentration was identified as 2019.

The highest long-term PEC of PM_{10} when using 2019 meteorological data is 17.61 µg/m^3. This occurs at the receptor location of the EA MMF10 (D22) (approximately 50m east of the eastern boundary). The PEC is below the relevant long-term AQS of 40 µg/m^3 for the protection of human health.

Table 6-6. The Maximum Long-Term (Annual Mean) Concentrations of PM_{10} – Scenario 2

Pollutant	Year	Process Contrib'tn (PC)	PC as %age of AQO	Background from the Traffic assessment	PEC[a] (PC +Background)	Easting (m)	Northing (m)	Receptor Name
PM_{10}	2017	1.54	3.84	15.84	17.38	551337	180903	The EA MMF10 (D22)
PM_{10}	2018	1.64	4.10	15.84	17.48	551337	180903	The EA MMF10 (D22)
PM_{10}	2019	1.77	4.41	15.84	17.61	551337	180903	The EA MMF10 (D22)
AQOs	40							

Note:

a. *Inclusive of Background concentration from the traffic assessment.*

Table 6-7 presents a summary of the predicted PM_{10} concentrations, both PCs and PECs, at the modelled receptors locations.

The significance of changes associated with the operations of the plant with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-7**.

Table 6-7. The Long-Term (Annual Mean) Concentrations of PM_{10} and Impact Description of Effects at Receptors – Scenario 2

Receptor		Predicted Annual Mean Concentration (µg/m³) – 2019 Met Data, and PM_{10} Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D1	8 Manstead Gardens Rainham (residential)	0.015	0.038	18.80	18.82	47.04	≤ 75 of AQO	Negligible
D2	6 River Close Rainham (residential)	0.018	0.046	18.63	18.65	46.62	≤ 75 of AQO	Negligible
D3	56 Elizabeth Road (residential)	0.021	0.052	18.49	18.51	46.28	≤ 75 of AQO	Negligible
D4	15 Palliser Drive Rainham (residential)	0.020	0.050	18.42	18.44	46.10	≤ 75 of AQO	Negligible
D5	21 Broadway, Rainham (residential)	0.014	0.035	17.78	17.79	44.49	≤ 75 of AQO	Negligible
D6	Flat 49 Dunedin Road (residential)	0.007	0.016	17.93	17.94	44.84	≤ 75 of AQO	Negligible
D7	2a Phillip Road (residential)	0.005	0.013	17.79	17.80	44.49	<76 of AQO	Negligible
D8	107 New Road (residential)	0.004	0.011	19.14	19.14	47.86	≤ 75 of AQO	Negligible
D9	162 Oval Road South Dagenham	0.003	0.007	17.35	17.35	43.38	≤ 75 of AQO	Negligible
D10	16 Sunningdale close London (residential)	0.004	0.009	17.26	17.26	43.16	≤ 75 of AQO	Negligible
D11	23 Bayliss Avenue (residential)	0.004	0.010	17.89	17.89	44.73	≤ 75 of AQO	Negligible
D12	140 Norman Road (residential)	0.006	0.015	17.06	17.07	42.66	≤ 75 of AQO	Negligible
D13	30 Poppy Close Belvedere (residential)	0.006	0.016	17.06	17.07	42.67	≤ 75 of AQO	Negligible
D14	1 Beltwood Road Belvedere (residential)	0.004	0.009	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D15	4 Ashburnham Road Belvedere (residential)	0.004	0.009	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D16	50 Battle Road Erith (residential)	0.004	0.009	17.13	17.13	42.83	≤ 75 of AQO	Negligible
D17	51 Lower Road Erith (residential)	0.004	0.010	17.13	17.13	42.84	≤ 75 of AQO	Negligible
D18	32 Galleon Close Erith (residential)	0.005	0.011	17.13	17.13	42.84	≤ 75 of AQO	Negligible
D19	116 Chandlers Drive Erith (residential)	0.004	0.011	16.05	16.05	40.14	≤ 75 of AQO	Negligible
D20	H Smith Food Group	0.431	1.077	15.78	16.21	40.53	≤ 75 of AQO	Negligible
D21	Quantum Group	0.811	2.027	15.80	16.61	41.53	≤ 75 of AQO	Negligible
D22	The EA MMF10 [a]	1.765	4.413	15.84	17.61	44.01	≤ 75 of AQO	Negligible
D23	Thermit Welding on Ferry Lane	1.045	2.613	15.86	16.91	42.26	≤ 75 of AQO	Negligible

Receptor		Predicted Annual Mean Concentration (µg/m^3) – 2019 Met Data, and PM_{10} Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[a] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D24	TotalFood Distribution Ltd	0.283	0.708	18.09	18.37	45.93	≤ 75 of AQO	Negligible
D25	Shanks Municipal waste Management	0.902	2.255	15.83	16.73	41.83	≤ 75 of AQO	Negligible
D26	Footpath	0.371	0.927	17.98	18.35	45.88	≤ 75 of AQO	Negligible
AQO		**40 µg/m^3**						

The % change in process concentrations relative to the AQAL as a result of the plant operations at all receptor locations, with respect to PM_{10} exposure, are determined to be 4.41 % or less. The significance is determined to be 'negligible' based on the methodology outlined in Section 3.

Therefore, the predicted long-term PM_{10} concentrations from the Site are considered acceptable for the protection of human health.

6.2.2 Short-Term (annual Mean) PM_{10} – Scenario 2

The short-term emissions of PM_{10} from the sources considered were assessed for all 3 years of meteorological data. The maximum PECs are compared against the relevant AQS, in **Table 6-8**.

Table 6-8. The Maximum Predicted 24-hour Mean (the 90.41th Percentile) Concentration of PM_{10} (µg/m^3) – Scenario 2

Pollutant	Year	Process Contrib'tn (PC)	PC as %age of AQO	Background from the Traffic assessment	PEC[a] (PC +Background)	Easting (m)	Northing (m)	Receptor Name
PM_{10}	2017	2.62	5.25	15.84	18.46	551337	180903	The EA MMF10 (D22)
PM_{10}	2018	2.96	5.92	15.84	18.80	551337	180903	The EA MMF10 (D22)
PM_{10}	2019	3.15	6.31	15.84	18.99	551337	180903	The EA MMF10 (D22)
AQOs	50							

Note:

a. *Inclusive of Background concentration from the traffic assessment.*

The maximum PECs of short-term PM_{10} for the 3 years of meteorological data assessed do not exceed the relevant AQS, at any receptor locations. From the meteorological dataset, the year resulting in maximum short-term PM_{10} concentration was identified as 2019.

The highest short-term PEC of PM_{10} when using 2019 meteorological data is 18.99µg/m^3. This occurs at the receptor location of the EA MMF10 (D22) (approximately 50m east of the eastern boundary). The PEC is below the relevant short-term AQS of 50 µg/m^3 for the protection of human health

The short-term PM_{10} PEC concentrations have been calculated at each of the discrete receptors listed for the worst meteorological year of 2019 and these results are detailed in **Table 6-9**.

Table 6-9. The Predicted 24-hour Mean (the 90.41th Percentile) Concentrations of PM_{10} at Receptors – Scenario 2

Receptor		Predicted 24-hour Mean (90.41th Percentile) Concentration (µg/m3) – 2019 Met Data					
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	Impact Descriptor [1]
D1	8 Manstead Gardens Rainham (residential)	0.04	0.08	18.80	18.84	37.68	Negligible
D2	6 River Close Rainham (residential)	0.05	0.09	18.63	18.68	37.35	Negligible
D3	56 Elizabeth Road (residential)	0.05	0.11	18.49	18.54	37.09	Negligible
D4	15 Palliser Drive Rainham (residential)	0.05	0.10	18.42	18.47	36.94	Negligible
D5	21 Broadway, Rainham (residential)	0.03	0.07	17.78	17.81	35.63	Negligible
D6	Flat 49 Dunedin Road (residential)	0.02	0.03	17.93	17.95	35.89	Negligible
D7	2a Phillip Road (residential)	0.01	0.03	17.79	17.80	35.61	Negligible
D8	107 New Road (residential)	0.01	0.02	19.14	19.15	38.30	Negligible
D9	162 Oval Road South Dagenham	0.01	0.01	17.35	17.36	34.71	Negligible
D10	16 Sunningdale close London (residential)	0.01	0.02	17.26	17.27	34.54	Negligible
D11	23 Bayliss Avenue (residential)	0.01	0.02	17.89	17.90	35.80	Negligible
D12	140 Norman Road (residential)	0.02	0.04	17.06	17.08	34.16	Negligible
D13	30 Poppy Close Belvedere (residential)	0.02	0.04	17.06	17.08	34.16	Negligible
D14	1 Beltwood Road Belvedere (residential)	0.01	0.02	17.13	17.14	34.28	Negligible
D15	4 Ashburnham Road Belvedere (residential)	0.01	0.02	17.13	17.14	34.28	Negligible
D16	50 Battle Road Erith (residential)	0.01	0.02	17.13	17.14	34.28	Negligible
D17	51 Lower Road Erith (residential)	0.01	0.03	17.13	17.14	34.29	Negligible
D18	32 Galleon Close Erith (residential)	0.01	0.02	17.13	17.14	34.28	Negligible
D19	116 Chandlers Drive Erith (residential)	0.01	0.02	16.05	16.06	32.12	Negligible
D20	H Smith Food Group	1.07	2.13	15.78	16.85	33.69	Negligible
D21	Quantum Group	1.62	3.23	15.80	17.42	34.83	Negligible
D22	The EA MMF10 [a]	3.15	6.31	15.84	18.99	37.99	Negligible
D23	Thermit Welding on Ferry Lane	2.01	4.02	15.86	17.87	35.74	Negligible
D24	TotalFood Distribution Ltd	0.62	1.24	18.09	18.71	37.42	Negligible
D25	Shanks Municipal waste Management	1.70	3.39	15.83	17.53	35.05	Negligible
D26	Footpath	0.78	1.56	17.98	18.76	37.52	Negligible
AQO		**50 µg/m3**					

Note 1. IAQM Guidance of "Land-Use Planning & Development Control: Planning For Air Quality, January 2017", states: "***6.39*** *Where such peak short-term concentrations from an elevated source are in the range 11-20% of the relevant AQAL, then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. That is not to say that background concentrations are unimportant, but they will, on an annual average basis, be a much smaller quantity than the peak concentration caused by a substantial plume and it is the contribution that is used as a measure of the impact, not the overall concentration at a receptor. This approach is intended to be a streamlined and pragmatic assessment procedure that avoids undue complexity."*

From **Table 6-9**, it can be seen that the predicted short-term PCs of PM_{10} at discrete receptors range from 0.01 to 3.15 µg/m^3. There are no exceedances of the short-term PM_{10} AQS at any of the identified discrete receptors; indeed the predicted impacts are significantly below the AQS of 50 µg/m^3.

Therefore, the predicted short-term PM_{10} concentrations from the Site are considered acceptable for the protection of human health.

The contour plots of the predicted long-term and short-term ground level PCs of PM_{10} for all receptors, including discrete, boundary and grid receptors are presented in **Figure 6-3** and **Figure 6-4**. The contour plots show that the predicted maximum concentrations occur adjacent to the emission source, with a predicted decrease in concentration with the increased distance from the emission source.

Figure 6-3. Long-Term PM_{10} PC – Scenario 2

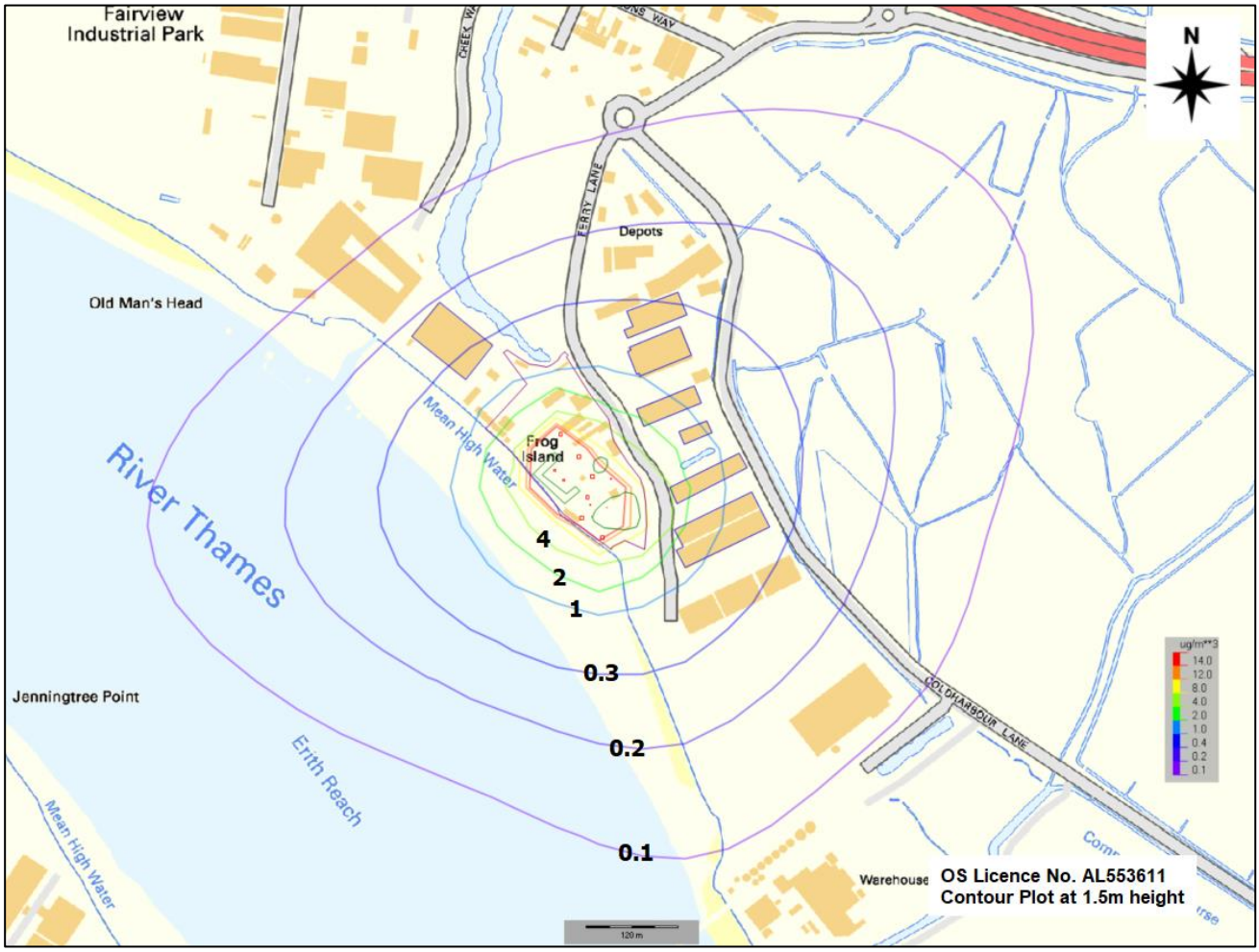
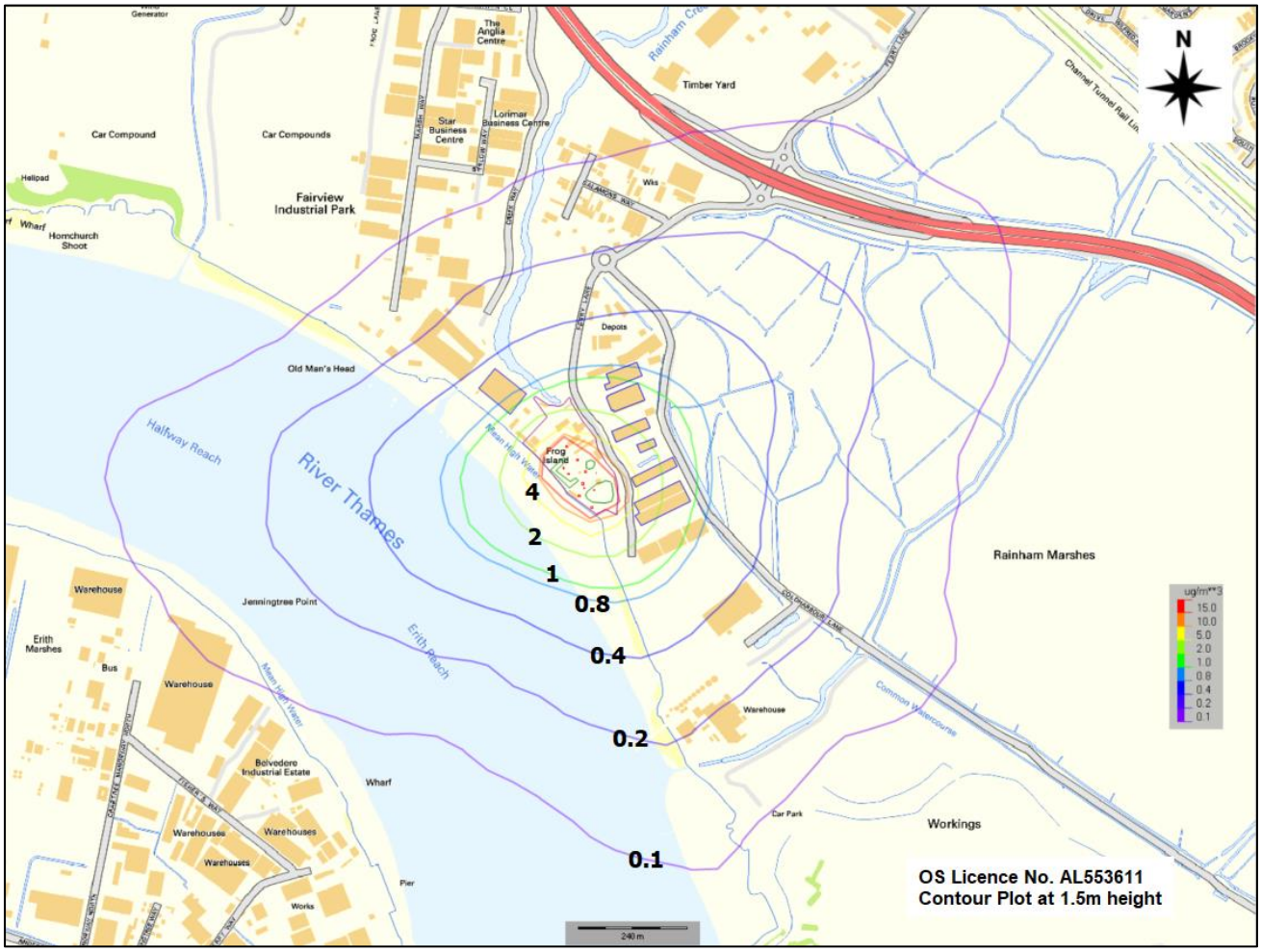


Figure 6-4. Short-Term (24-hour mean, 90.41th Percentile) PM_{10} PC – Scenario 2



6.2.3 Particulate Matter ($PM_{2.5}$) – Scenario 2

A worst-case scenario assumption of 100% of PM_{10} to be $PM_{2.5}$ has been made in the assessment. The predicted long-term PCs of $PM_{2.5}$ using 2019 met data and the significance of changes associated with the operations of the plant with respect to annual mean $PM_{2.5}$ exposure has been presented and assessed in **Table 6-10**.

Table 6-10. The Long-Term (Annual Mean) Concentrations of $PM_{2.5}$ and Impact Description of Effects at Receptors – Scenario 2

Receptor		Predicted Annual Mean Concentration (µg/m³) – 2019 Met Data, and $PM_{2.5}$ Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D1	8 Manstead Gardens Rainham (residential)	0.015	0.076	12.32	12.34	61.68	≤ 75 of AQO	Negligible
D2	6 River Close Rainham (residential)	0.018	0.092	12.23	12.25	61.24	≤ 75 of AQO	Negligible
D3	56 Elizabeth Road (residential)	0.021	0.104	12.14	12.16	60.80	≤ 75 of AQO	Negligible
D4	15 Palliser Drive Rainham (residential)	0.020	0.100	12.10	12.12	60.60	≤ 75 of AQO	Negligible
D5	21 Broadway, Rainham (residential)	0.014	0.071	11.95	11.96	59.82	≤ 75 of AQO	Negligible
D6	Flat 49 Dunedin Road (residential)	0.007	0.033	12.04	12.05	60.23	≤ 75 of AQO	Negligible
D7	2a Phillip Road (residential)	0.005	0.025	11.96	11.97	59.83	<76 of AQO	Negligible
D8	107 New Road (residential)	0.004	0.021	12.75	12.75	63.77	≤ 75 of AQO	Negligible
D9	162 Oval Road South Dagenham	0.003	0.013	11.80	11.80	59.01	≤ 75 of AQO	Negligible
D10	16 Sunningdale close London (residential)	0.004	0.019	11.96	11.96	59.82	≤ 75 of AQO	Negligible
D11	23 Bayliss Avenue (residential)	0.004	0.019	12.08	12.08	60.42	≤ 75 of AQO	Negligible
D12	140 Norman Road (residential)	0.006	0.030	11.58	11.59	57.93	≤ 75 of AQO	Negligible
D13	30 Poppy Close Belvedere (residential)	0.006	0.032	11.58	11.59	57.93	≤ 75 of AQO	Negligible
D14	1 Beltwood Road Belvedere (residential)	0.004	0.018	11.73	11.73	58.67	≤ 75 of AQO	Negligible
D15	4 Ashburnham Road Belvedere (residential)	0.004	0.018	11.73	11.73	58.67	≤ 75 of AQO	Negligible
D16	50 Battle Road Erith (residential)	0.004	0.018	11.73	11.73	58.67	≤ 75 of AQO	Negligible
D17	51 Lower Road Erith (residential)	0.004	0.020	11.73	11.73	58.67	≤ 75 of AQO	Negligible
D18	32 Galleon Close Erith (residential)	0.005	0.023	11.73	11.73	58.67	≤ 75 of AQO	Negligible
D19	116 Chandlers Drive Erith (residential)	0.004	0.022	10.98	10.98	54.92	≤ 75 of AQO	Negligible
D20	H Smith Food Group	0.431	2.155	10.77	11.20	56.00	≤ 75 of AQO	Negligible
D21	Quantum Group	0.811	4.055	10.79	11.60	58.00	≤ 75 of AQO	Negligible
D22	The EA MMF10	1.765	8.826	10.81	12.58	62.88	≤ 75 of AQO	Slight
D23	Thermit Welding on Ferry Lane	1.045	5.226	10.82	11.87	59.33	≤ 75 of AQO	Slight

Receptor		Predicted Annual Mean Concentration (µg/m^3) – 2019 Met Data, and $PM_{2.5}$ Impact Description at Receptors						
ID	Name	Process Contribution (PC)	PC as percentage of AQO (%)	Background from the Traffic assessment	PEC[(a)] (PC +Background)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D24	Total Food Distribution Ltd	0.283	1.416	12.01	12.29	61.47	≤ 75 of AQO	Negligible
D25	Shanks Municipal waste Management	0.902	4.509	10.81	11.71	58.56	≤ 75 of AQO	Negligible
D26	Footpath	0.371	1.853	11.94	12.31	61.55	≤ 75 of AQO	Negligible
AQO		**20 µg/m^3**						

The predicted long-term $PM_{2.5}$ concentrations at receptor locations are below the AQAL.

The percentage change in process concentrations relative to the AQAL as a result of the plant operations at all receptor locations, with respect to $PM_{2.5}$ exposure, are determined to be 8.826% or less. The significance is determined to range from 'negligible' to 'slight'. It should be noted that the assessment results were based on the assumption of 100% of PM_{10} to be $PM_{2.5}$.

Therefore, the predicted long-term $PM_{2.5}$ concentrations from the Site are considered acceptable for the protection of human health.

7.0 CONCLUSIONS

Tetra Tech Limited have been commissioned by PDE Consulting Limited to undertake a detailed particulate matter (PM_{10} & $PM_{2.5}$) impact assessment in support of a planning application for a waste recycling facility at Frog Island, Ferry Lane South, Rainham, Essex, RM13 9DB (the 'Site').

This Site is used for the importation, storage and treatment of up to 209,000 tonnes of waste per year to produce secondary aggregate.

Baseline air quality conditions have been defined. Two particulate matter emission scenarios from the site activities have been assessed:

- Scenario 1 - using the typical or average values of the particulate matter emission factors for the site activities and operation conditions; and
- Scenario 2 - using the maximum or worst-case values of the particulate matter emission factors for the site activities and operation conditions.

Detailed dispersion modelling using AERMOD modelling software has been undertaken and the modelling results have been presented in this report in terms in terms of the emitted pollutant Process Contribution (PC) and Predicted Environmental concentration (PEC = PC+ Background concentration). The modelling used the most representative meteorological dataset. The worst-case, highest predicted long-term and short-term PECs were compared to the appropriate Air Quality Objectives / Environmental Assessment Levels (AQOs/ EALs) for the protection of human health.

Scenario 1 Results

The long-term and short-term predicted environmental concentrations of PM_{10} from the facility operations at the identified receptor locations are all below the relevant air quality objectives for the protection of human health. The significance of the PM_{10} impact is determined to be 'negligible' for all the considered receptors.

The long-term predicted environmental concentrations of $PM_{2.5}$ from the facility operations at the identified receptor locations are all below the relevant air quality objectives. The significance of the $PM_{2.5}$ impact is determined to be 'negligible' for all the residential receptors for the protection of human health. The significance is determined to be 'slight' at two nearby receptor locations of the EA MMF10 (which is located in the Thermit Welding GB Ltd on Ferry Lane) and the River Thames receptor.

Scenario 2 Results

The long-term and short-term predicted environmental concentrations of PM_{10} from the facility operations at the identified receptor locations are all below the relevant air quality objectives for the protection of human health. The significance of the PM_{10} impact is determined to be 'negligible' for all the receptors.

The long-term predicted environmental concentrations of $PM_{2.5}$ from the facility operations at the identified receptor locations are all below the relevant air quality objectives for the protection of human health. The significance the $PM_{2.5}$ impact is determined to be 'negligible' to 'slight for all the residential receptors. The

significance is determined to be 'slight' at three nearby receptor locations of the EA MMF10 receptor, the Thermit Welding GB Ltd on Ferry Lane receptor and the River Thames receptor.

Therefore, the predicted PM_{10} and $PM_{2.5}$ concentrations from the Site operations are considered acceptable for the protection of human health for both scenarios 1 and 2.

The detailed dispersion modelling exercises have identified that the particulate matter emission from site surfaces from the moving loading shovel is a major source. Therefore, the mitigation controls including removal and reduction of the materials on the surface where the loading shovel is travelling on (to reduce the silt loading values for the surface) are included in the Dust Management Plan. The mitigation control measures will also include an adequate supply of water for spray equipment (bowser, hoses and/or mist sprays) to ensure that the rate of application would be sufficient for the purpose of dampening ground surfaces, and materials in stockpiles.

There is no published guidance available that provides long-term and short-term threshold or critical levels in the assessment of the effects of suspended particulate matter (PM_{10} or $PM_{2.5}$) on ecological receptors.

The suspended particulate matter will be dispersed away in the air from the sources and the generated particulate matter is unlikely to result in a particulate deposition level above 1000 mg m-2 day-1 at any identified ecological receptors of River Thames SINC/Tidal Tributaries SINC, Rainham Marshes LNR, and Inner Thames Marshes SSSI. Therefore, the significance of the particulate matter impact on the ecological sites is considered to be 'negligible'.

It is considered that with these controls in place the significance/effect of PM_{10}/$PM_{2.5}$ impact of the scheme will be acceptable.

APPENDIX A - REPORT TERMS & CONDITIONS

This Report has been prepared using reasonable skill and care for the sole benefit of PDE Consulting Limited ("the Client") for the proposed uses stated in the report by Tetra Tech Limited ("Tetra Tech"). Tetra Tech exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

No liability is accepted, or warranty given for; unconfirmed data, third party documents and information supplied to Tetra Tech or for the performance, reliability, standing etc. of any products, services, organisations or companies referred to in this report. Tetra Tech does not purport to provide specialist legal, tax or accounting advice.

The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including; its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. Tetra Tech accept no liability for issues with performance arising from such factors.

APPENDIX C – FROG ISLAND PARTICULATE MATTER/DUST MONITORING RESULTS – TETRA TECH - MONITORING UNDERTAKEN IN MAY 2022

Frog Island, Ferry Lane South, Rainham, RM13 9DB

Particulate Matter Monitoring Report

Issue 1

May 2022

784-B034776

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NON-TECHNICAL SUMMARY

Tetra Tech Limited have undertaken real-time dust monitoring during May and June 2022 at two locations, for the construction and development of Frog Island.

Figure A-1 shows the current monitoring locations of the two Zephyr Dust Monitors.

The location is representative of worst-case dust emissions at the site relative to the activities undertaken on site and the sensitive receptors around the site. Monitoring Location 1 is located in the north- of the site, upwind of the predominant wind direction shown in **Figure A-6-2**, adjacent to the site access. This monitoring location is representative of nearby receptors on Ferry Lane. Monitoring Location 2 is located near the eastern boundary of the site, upwind of the predominant wind direction shown in **Figure A-6-2**. This monitoring location is representative of nearby receptors on Ferry Lane.

Tetra Tech Limited Technicians deployed the monitoring pods on site on the 25th May 2022.

Currently processing activities are occurring at the centre and south of the site, south of Monitoring Location 1 and south-east of Monitoring Location 2.

With reference to published guidance by the Institute of Air Quality Management (*Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites'*, 2018), the real-time monitoring results have been compared utilising a traffic light system. These are detailed in **Table NT1** below, which also outlines the action to be taken if each alert level is breached.

Table NT1. Traffic Light Criteria

Alert level	Time Period	PM_{10} Maximum Permissible 15-minute average (µg/m³)	$PM_{2.5}$ Maximum Permissible 15-minute average (µg/m³)
Red (*at this level all works to cease immediately, investigate cause of exceedance and use alternative methods where appropriate*)	15-minute average	>190 µg/m³	>48 µg/m³
Amber (*continual monitoring and investigation of alternative methods where appropriate*)	Two consecutive 15-minute averages	>80 µg/m³	>38 µg/m³
Green (*early warning/no action required*)	15-minute average	>80 µg/m³	>38 µg/m³

The measures outlined below were implemented on site during May and June 2022 to be applied when required on an ongoing basis:

- Stockpiles sealed or sprayed;
- Stockpiles located away from any sensitive receptors;
- Mobiles bowsers deployed at regular intervals, increasing in frequency during significantly dry and windy periods;
- Use of hoardings to ensure reduction in dust migration;
- Deliveries of significantly dusty materials sprayed to reduce dust potential; and,

- When crushing material on-site, equipment similar to dust busters used for dust suppression.

In conclusion, during May and June 2022, appropriate measures were implemented to mitigate dust emissions from the development site and no exceedances were observed during the month which were attributable to on-site activities. Tetra Tech Limited will continue to monitor the concentrations of PM_{10} and $PM_{2.5}$ on site. These will continue to be cross-checked with urban background concentrations and the demolition schedule to identify appropriate locations for the air quality monitoring and to inform any required future mitigation measures.

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APPENDICES

1.0 INTRODUCTION

An air quality monitoring survey is being undertaken to determine levels of PM_{10} and $PM_{2.5}$ as a result of the proposed construction and development at Frog Island, London. Two monitoring locations were set up to reflect the active work on the site, and to best represent the receptor locations nearby.

The purpose of this report is to review the monitored concentrations of PM_{10} and $PM_{2.5}$ observed during May 2022 – June 2022, against criteria determined from appropriate guidance to minimise disruption to nearby sensitive receptors as a result of the works.

The Institute of Air Quality Management (IAQM) '*Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*' May 2020 guidance outlines the onsite action levels for PM10. The action levels for this site are set at a PM10 concentration of over 190 µg/m^3 over a 15-minute period, a $PM_{2.5}$ concentration of over 48 µg/m^3 over a 15-minute period for $PM_{2.5}$.

The current operating hours of the site are as follows:

- Monday – Friday: 05:00 – 20:00
- Saturday – Sunday: 06:00 – 17:00

This report relates to measurements taken between 25th May and 14th June 2022.

2.0 POLICY AND LEGISLATIVE CONTEXT

2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised December 2023;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, 2007;
- The Environment Act, 1995;
- The Environment Act, 2021;
- Local Air Quality Management Technical Guidance LAQM.TG(16), Defra, 2021;
- London Local Air Quality Management Technical Guidance LLAQM.TG19, Mayor of London, 2019;
- Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites, IAQM, 2020;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2024; and,
- London Plan Supplementary Planning Guidance (SPG) 'The Control of Dust and Emissions during Construction and Demolition', July 2014.

2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality 'Daughter' Directive – sets ambient air limit values for NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **Directive 2000/69/EC** – the Second Air Quality 'Daughter' Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality 'Daughter' Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in Scotland, Wales and Northern Ireland.

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

UK Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amends the AQO for $PM_{2.5}$ outlined within the Air Quality Standards Regulations (2010 & 2016 Amendments).

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in **Table 2-1** along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines. The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

Table 2-1. Air Quality Standards, Objectives, Limits and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50µg/m^3 by end of 2004 (max 35	24-hour Mean	1st January 2005	50µg/m^3 by end of 2004 (max 35	1st January 2005	Retain Existing

		exceedances a year)			exceedances a year)		
	UK	40µg/m^3 by end of 2004	Annual Mean	1st January 2005	40µg/m^3	1st January 2005	
$PM_{2.5}$	UK	20µg/m^3	Annual Mean	1st January 2020	-	-	Retain Existing

There are currently no UK or EU objectives for PM_1.

Environment Act 2021

The Environment Act (2021) introduces a commitment to create a legally binding duty on government to reduce the concentrations of fine particulate matter ($PM_{2.5}$) in ambient air, and to set a long-term target expected to be 10 µg/m^3, a reduction from the current Air Quality objective of 20 µg/m^3 set out within the Air Quality Standards Regulations (Amendment 2016). A draft of a statutory instrument (or drafts of statutory instruments) containing regulations setting the $PM_{2.5}$ air quality target must be laid before Parliament on or before 31st October 2022 and is expected to come into force thereafter.

2.3 PLANNING AND POLICY GUIODANCE

National Policy

The National Planning Policy Framework (NPPF), last updated December 2023, sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

The purpose of the planning system is to contribute to the achievement of sustainable development. NPPF states three objectives for sustainable development.

"8. Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and

c) an environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

Planning policies

Following sections within the NPPF are related to the improvement of air quality:

Paragraph 180

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) 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 and water quality, taking into account relevant information such as river basin management plans."

Paragraph 192

"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."

Paragraph 194

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

Regional Policy

The London Borough of Havering (LBH) lies within the Greater London Authority (GLA) Area. The London Plan- the spatial development strategy for Greater London, March 2021 addresses topics related to the improvement of air quality.

"Policy SD4 The Central Activities Zone (CAZ)

D. Taking account of the dense nature of the CAZ, practical measures should be taken to improve air quality, using an air quality positive approach where possible (Policy SI 1 Improving air quality) and to address issues related to climate change and the urban heat island effect."

"Policy D1 London's form, character and capacity for growth

A. Boroughs should undertake area assessments to define the characteristics, qualities and value of different places within the plan area to develop an understanding of different areas' capacity for growth. Area assessments should cover the elements listed below:
5)air quality and noise levels."

"Policy D3 Optimising site capacity through the design-led approach

Experience

9) help prevent or mitigate the impacts of noise and poor air quality."

"Policy E5 Strategic Industrial Locations (SIL)

D. Development proposals within or adjacent to SILs should not compromise the integrity or effectiveness of these locations in accommodating industrial type activities and their ability to operate on a 24-hour basis. Residential development adjacent to SILs should be designed to ensure that existing or potential industrial activities in SIL are not compromised or curtailed. Particular attention should be given to layouts, access, orientation, servicing, public realm, air quality, soundproofing and other design mitigation in the residential development."

"Policy E7 Industrial intensification, co-location and substitution

D. The processes set out in Parts B and C above must ensure that: f)) air quality, including dust, odour and emissions and potential contamination."

"Policy SI1 Improving Air Quality

A. 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.

B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1. Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) 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

c) create unacceptable risk of high levels of exposure to poor air quality.

2. In order to meet the requirements in Part 1, as a minimum:

a) Development proposals must be at least air quality neutral

b) 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 retrofitted mitigation measures

c) 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

d) 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.

C. 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:

a) How proposals have considered ways to maximise benefits to local air quality, and

b) What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this

D. 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.

E. 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."

"Policy SI8 Waste capacity and net waste self-sufficiency

E. Developments proposals for new waste sites or to increase the capacity of existing sites should be evaluated against the following criteria:4) the impact on amenity in surrounding areas

(including but not limited to noise, odours, air quality and visual impact) – where a site is likely to produce significant air quality, dust or noise impacts, it should be fully enclosed."

***"**Policy T6.2 Office Parking*

D. Outer London boroughs wishing to adopt more generous standards are required to do so through an evidence-based policy in their Development Plan that identifies the parts of the borough in which the higher standards will be applied, and justifies those standards, including:3) the impact on congestion and air quality locally and on neighbouring boroughs and districts outside London as appropriate."

***"**Policy T8 Aviation*

B. The environmental and health impacts of aviation must be fully acknowledged and aviation-related development proposals should include mitigation measures that fully meet their external and environmental costs, particularly in respect of noise, air quality and climate change. Any airport expansion scheme must be appropriately assessed and if required demonstrate that there is an overriding public interest or no suitable alternative solution with fewer environmental impacts.

C. The Mayor will oppose the expansion of Heathrow Airport unless it can be shown that no additional noise or air quality harm would result, and that the benefits of future regulatory and technology improvements would be fairly shared with affected communities."

Local Plan – the London Borough of Havering

The LBH Council adopted the Havering Local Plan 2016 – 2031 (adopted November 2021), which outlines the Council's broad planning strategy. Following a review of policies within the development core strategy, the following statements were identified as being relevant to the proposed development from an air quality perspective:

Policy 12 Healthy Communities

The Council will support development in Havering that provides opportunities for healthy lifestyles, contribute to the creation of healthier communities and helps reduce health inequalities.

The Council will seek to maximise the potential health gains from development proposals and ensure that any negative impacts are mitigated. All major development proposals must be supported by a Health Impact Assessment (HIA) to demonstrate that full consideration has been given to health and wellbeing.

The Local Plan will promote health and wellbeing by: …

viii. Seeking environmental improvements, minimising exposure to pollutants and improving air quality (refer to Policies 33 and 34);

Developers are required to consider wider local/regional primary care and other health strategies, as appropriate, to take into account how any developments can contribute to the aims and objectives of those strategies.

Policy 19: Business Growth

The Council is committed to building a strong and prosperous economy in Havering and will encourage and promote business growth by:

i. *Protecting designated Strategic Industrial Locations for industrial uses as set out in the London Plan;*
ii. *Protecting designated Locally Significant Industrial Sites for B1 (b) (c), B2 and B8 uses;*
….

Waste uses will be assessed in accordance with the Joint Waste Development Plan Document.

Policy 23: Transport Connections

The Council will support and encourage developments in Havering in the locations that are most accessible by a range of transport options.

The Council supports development which ensures safe and efficient use of the highway and demonstrates that adverse impacts on the transport network are avoided or, where necessary, mitigated. Major planning applications will require a transport assessment in line with TfL's Transport Assessment Best Practice Guidance.

When bringing forward a planning application full Travel Plans or Travel Plan Statements will be required for development reaching certain thresholds as set out in Transport for London's (TfL) latest Guidance on Travel Plan requirements.

The Council will work with its partners, including developers, the Mayor of London and central government to improve transport infrastructure and the connectivity of the borough by: …

xi. *Tackling key congestion "hotspots" through remodelling of Gallows Corner and Romford Ring Road to improve motor vehicle traffic flow and improve air quality;*

The Council will work positively with those who share its ambition to deliver these key transport infrastructure improvements and will support development proposals that are able to contribute to their delivery.

Policy 26 Urban design

The Council will promote high quality design that contributes to the creation of successful places in Havering by supporting development proposals that:

i. *Are informed by, respect and complement the distinctive qualities, identity, character and geographical features of the site and local area;*
ii. *Are of a high architectural quality and design;*
iii. *Provide creative, site specific design solutions;*
iv. *Respect, reinforce and complement the local streetscene;*
v. *Provide active streets, good sight lines and natural surveillance;*
vi. *Are designed in accordance with the principles of Secured by Design;*
vii. *Respond to distinctive local building forms and patterns of development and respect the visual integrity and established scale, massing, rhythm of the building, frontages, group of buildings or the building line and height of the surrounding physical context;*
viii. *Fully integrate with neighbouring developments, existing path and circulation networks and patterns of activity particularly to accommodate active travel;*
ix. *Provide well-defined public realm with defensible private spaces;*
x. *Are built of high quality, durable, robust, low maintenance materials that integrate well with surrounding buildings;*
xi. *Provide a high standard of inclusive access for all members of the public;*
xii. *Demonstrate adequate on-going maintenance and management arrangements; and*
xiii. *Make use of design competitions or other creative processes that can improve the design quality.*

The council will require development proposals of a strategic nature to be subject to Design Review.

Policy 27 Landscaping

The Council will support development proposals that incorporate a detailed and high quality landscape scheme which:

i. *Takes full account of the landscape character of the site and its wider setting;*
ii. *Retains and enhances existing landscape features that contribute positively to the setting and character of the local area;*
iii. *Demonstrates how existing landscape features will be protected during the construction phase;*
iv. *Maximises opportunities for greening, through the planting of trees and other soft landscaping;*
v. *Provides strong boundary treatment that integrates with and is sympathetic to the local landscape character and street scene; and*
vi. *Supports natural habitats and opportunities for enhancing biodiversity.*

All proposals will be required to demonstrate that adequate arrangements have been made for future maintenance and management and major development proposals should be supported by a comprehensive Management Plan.

Policy 30 Biodiversity and Geodiversity

The Council will protect and enhance the borough's natural environment and seek to increase the quantity and quality of biodiversity in Havering by:

iii. *Ensuring developers demonstrate that the impact of proposals on protected sites and species have been fully assessed when development has the potential to impact on such sites or species. Appropriate mitigation and compensation measures will also need to be identified where necessary. If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission will normally be refused;*

iv. *Not permitting development which would adversely affect the integrity of Specific Scientific Interest, Local Nature Reserves and Sites of Importance for Nature Conservation except for reasons of overriding public interest, or where adequate compensatory measures are provided; If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission will normally be refused;*

v. *Supporting proposals where the primary objective is to conserve or enhance biodiversity;*

vi. *Encouraging developments where there are opportunities to incorporate biodiversity in and around the development;*

vii. *Supporting developments that promote the qualitative enhancement of sites of biodiversity value, (by supporting proposals that improve access, connectivity and the creation of new habitats. Measures include maintaining trees, native vegetation, and improving and restoring open spaces and green infrastructure for the benefit of wildlife;*

viii. *Working with partners and local conservation groups to improve conditions for biodiversity in the borough*

Policy 31 Rivers and river corridors

Havering's rivers and river corridors fulfil important biodiversity, recreation, placemaking, amenity, freight transport and flood management functions which the Council will seek to optimise.

The Council will seek to enhance the river environment by requiring major developments in close proximity to a river to investigate and, where feasible, secure opportunities to restore and enhance rivers and their corridors in line with the Thames River Basin Management Plan (RBMP). This should, wherever possible, include the integration of flood defences into new developments. Where enhancements or restoration are financially viable but not feasible a financial contribution will be sought.

To protect and enhance the biodiversity and amenity value of river corridors while accommodating future adaptations to flood defences, the Council will require development to be set back by 8 metres from main rivers, ordinary watercourses and other flood assets, and 16 metres from tidal rivers or defence structures, including tie rods and anchors.

In the Thames Policy Area (as identified on the Policies Map) the Council will support development which:

i. *Establishes a link with the river, preserves and enhances views to and from the river and creates a high quality built and natural environment;*
ii. *Contributes towards the enhancement and extension of a riverside path to enable local communities to enjoy the riverside providing the appropriate life-saving equipment such as grab chains, access ladders and life buoys are provided along the river edge;*
iii. *Facilitates and acts on the recommendations of the Thames Estuary 2100 Plan;*
iv. *Contributes to the safeguarding of Halfway Wharf and Phoenix Wharf from redevelopment for other purposes which would prejudice their use for river based freight related purposes.*

Policy 33 Air Quality

The Council is committed to improve air quality in Havering to improve the health and wellbeing of Havering's residents. The Council will support development which:

i. *Is at least air quality neutral;*
ii. *Optimises the use of green infrastructure to reduce pollution concentrations and exposure (see Policy 29);*
iii. *Delivers measures to support active travel to reduce emissions (see Policy 23)*
iv. *Meets the targets for carbon dioxide reduction in the London Plan (see Policy 36); and*
v. *Minimises emissions from construction (see Policy 34).*

Policy 34 Managing pollution

The Council will support development proposals that:

i. *Do not unduly impact upon amenity, human health and safety and the natural environment by noise, dust, odour and light pollution, vibration and land contamination;*
ii. *Do not pose an unacceptable risk to the quality of the water catchment, groundwater or surface water; and*
iii. *Optimise the design, layout and orientation of buildings and the use of green infrastructure to minimise exposure to the above pollutants*

Joint waste development plan for the east London Waste Authority boroughs

The Joint Waste DPD has been developed by the four East London Waste Authority (ELWA) boroughs of LB Barking & Dagenham, Havering, Newham and Redbridge. The DPD was adopted February 2012

Policy W5: General Considerations with regard to Waste Proposals

Planning permissions for a waste related development will only be granted where it can demonstrate that any impacts of the development can be controlled to achieve levels that will not significantly adversely affect people, land, infrastructure and resources.

Applications for new facilities that manage non-apportioned waste must demonstrate that there is not a more suitable site nearer the source of waste arising with regard to the factors listed below.

The information supporting the planning application must include, where relevant to a development proposal, assessment of the following matters and where necessary, appropriate mitigation should be identified so as to minimise or avoid any material adverse impact and compensate for any loss including:

(i) the release of polluting substances to the atmosphere or land arising from facilities and transport;
(ii) the amount of greenhouse gases produced;
(iii) the development on sites that are likely to be at greater risk now, or over the lifetime of the development due to climate change;
(iv) the likely increase in pressure on resources with climate change;
(v) the contamination of ground and surface water;
(vi) the drainage of the site and adjoining land and the risk of flooding;
(vii) water consumption requirements and consideration of water management within operational plant;
(viii) groundwater conditions and the hydrogeology of the locality;
(ix) the visual and landscape impact of the development on the site and surrounding land, including townscape and agricultural land;
(x) in the case of buildings, demonstration of high quality of design and sustainable construction and drainage techniques;
(xi) adverse effects on neighbouring amenity including transport, noise, fumes, vibration, glare, dust, litter, odour and vermin;
(xii) transport impact of all movements, including opportunities for use of sustainable transport modes, traffic generation, access and the suitability of the highway network in the vicinity, access to and from the primary route network;
(xiii) adverse impacts of all movements including: traffic generation, an unsuitable highway network, inadequate accessibility to the site or the primary road network in the vicinity; and limited or no opportunities for the use of sustainable transport modes;
(xiv) the loss or damage to significant biodiversity conservation interests;
(xv) the loss or damage to the historic environment, archaeological and cultural resources of value and importance;
(xvi) potential danger to aircraft from bird strike and structures;
(xvii) scope for limiting the duration of use; and
(xviii) the management arrangements for residues arising from any waste management facility.

3.0 ASSESSMENT CRITERIA

3.1 BACKGROUND CONCENTRATIONS

3.1.1 Background Pollutant Mapping

Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site.

The background data were published by Defra in a data group named as “Background Maps 2018” for PM_{10} and $PM_{2.5}$ in August 2020.

The updated mapped background concentrations surrounding the site are summarised in **Table 3-1**.

Table 3-1. Published Background Air Quality Levels (µg/m3)

UK NGR(m)		2021		2022	
X	Y	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
551196	180912	15.06	10.26	14.87	10.12

3.1.2 Background Pollutant on London Air

London Air Annual Maps

London Air’s annual mean pollution map uses a detailed model to show a prediction of PM_{10} and $PM_{2.5}$ annual averages across the whole of Greater London (https://londonair.org.uk/london/asp/annualmaps.asp).The latest annual mean air pollutions were modelled based on measurements made during 2016.

The detailed annual mean pollution maps of PM_{10} and $PM_{2.5}$ surrounding the site are displayed in **Figure 3-1** and

Figure 3-2.

Figure 3-1. Modelled Annual Mean PM_{10} Air Pollution (based on measurements made during 2016)

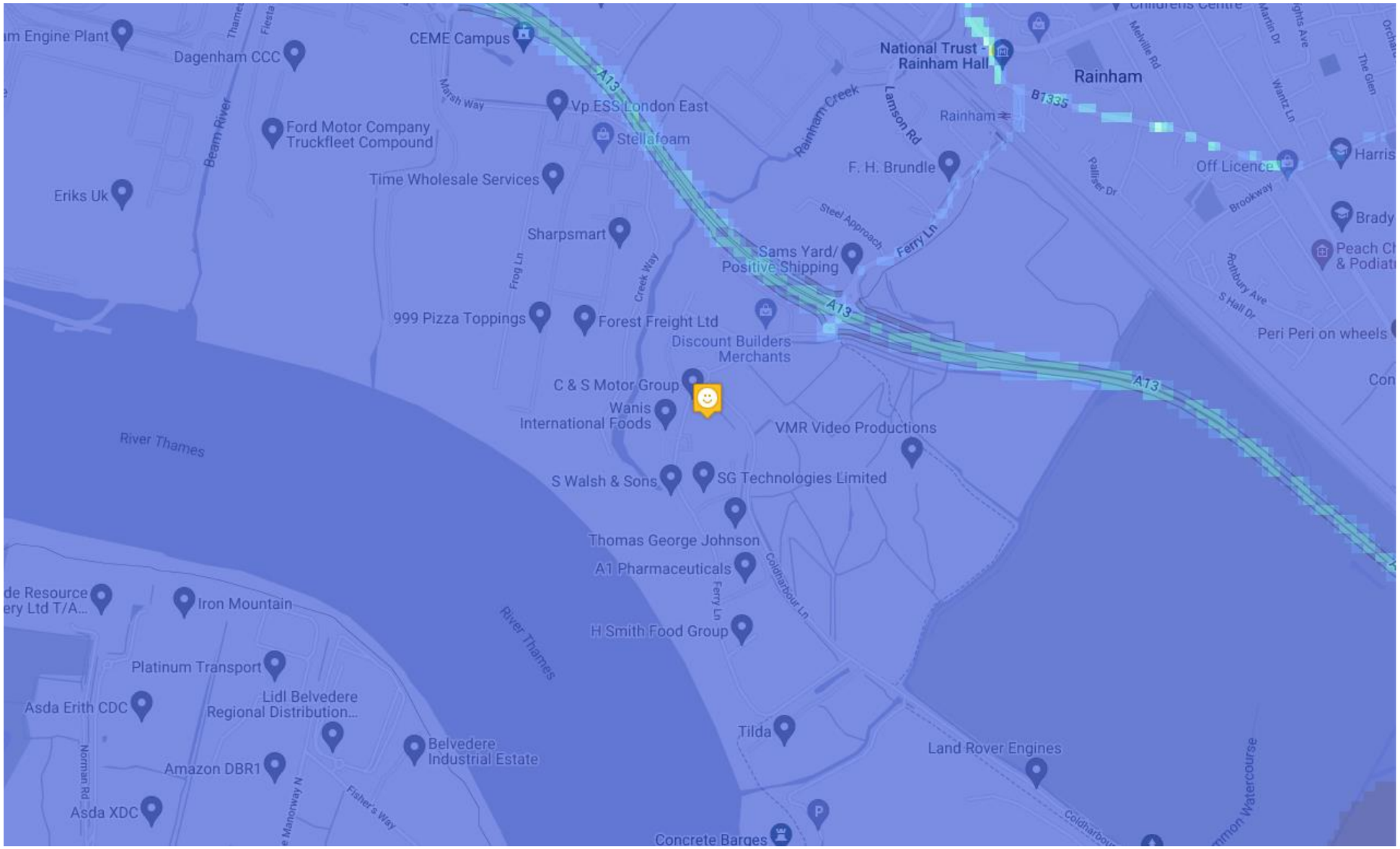
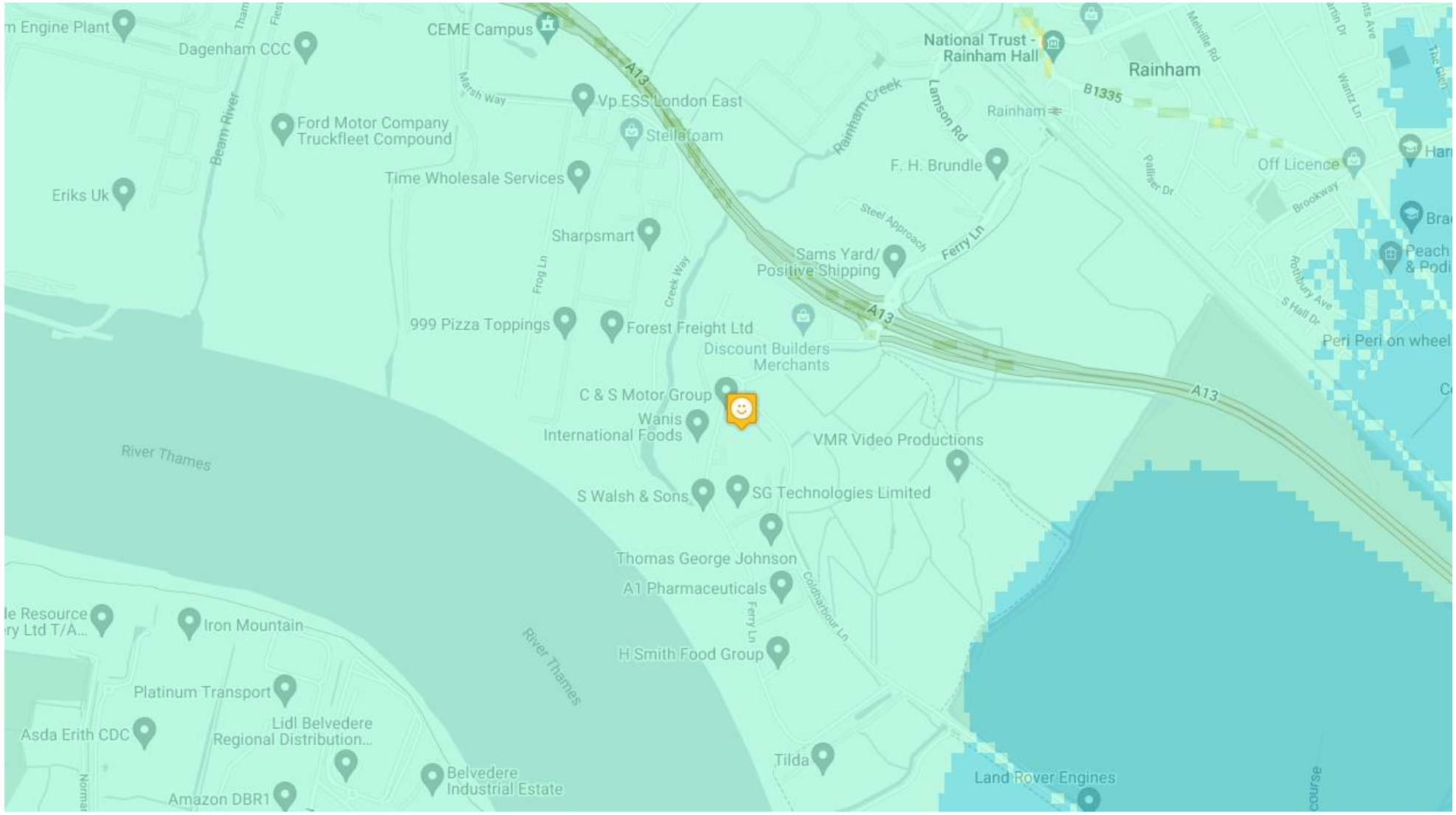


Figure 3-2. Modelled Annual Mean $PM_{2.5}$ Air Pollution (based on measurements made during 2016)



Key: Annual mean PM2.5 air pollution for 2016, in microgrammes per metre cubed (ug/m3)

<12	12	14	16	18	20	>22

Passes annual mean objective **Fails annual mean objective**

Figure 3-1 shows the predicted PM_{10} background is approximately 16 µg/m^3 at the Site and

Figure 3-2. The predicted PM_{10} background is approximately 12 µg/m^3 at the Site. Both PM_{10} and $PM_{2.5}$ are below the annual mean objectives.

London Air Monitoring Sites

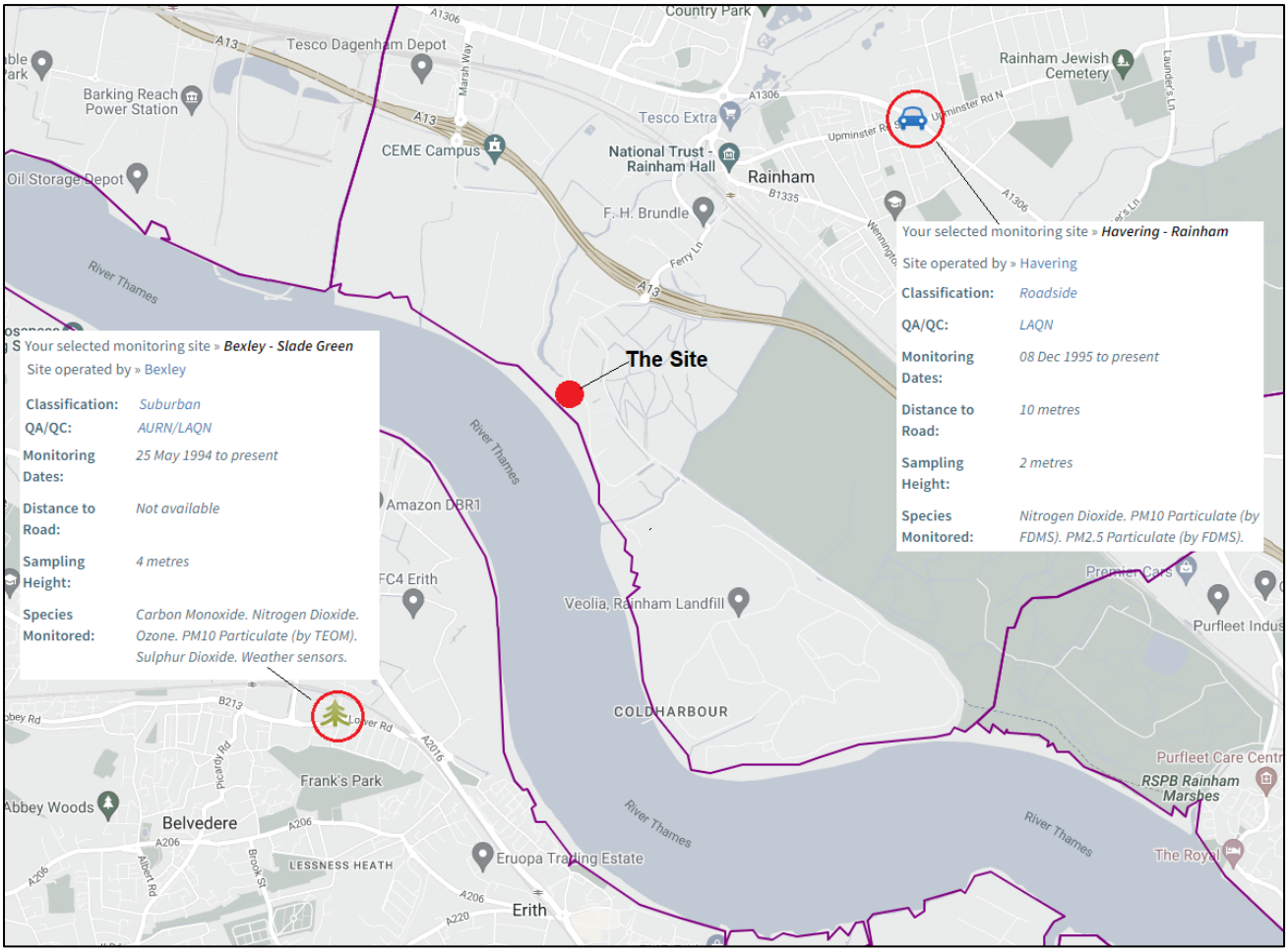
Air pollutant levels in London are monitored using London Air Quality Network (LAQN) and/or UK Automatic Urban and Rural Network (AURN). Both PM_{10} and $PM_{2.5}$ have been monitoring at the continuous monitoring site in neighboring location to the Site.

There are two neighboring LAQN sites to the Site and they are:

- Havering – Rainham, is located approximately 2.5 km NE of the site. The monitoring site is classed as roadsite and is operated by Havering. A roadsite is defined as a site with sample inlets between 1m and 5m of the kerbside and sampling heights are within 2-3m of the ground; and
- Bexley – Slade Green, is located approximately 2.2km SW of the Site. The monitoring site is classed as suburban site and is operated by Bexley. A suburban site is defined as a site is in typical of residential areas on the outskirts of a town or city.

The two LAQN sites are shown in **Figure 3-3**.

Figure 3-3. LAQN Monitoring Site Locations



4.0 POLLUTANT SOURCES

The main potential effects of dust and particulate matter are:

- Visual - dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health effects due to inhalation e.g., asthma or irritation of the eyes.

A number of other factors such as the amount of precipitation and other meteorological conditions will also greatly influence the amount of particulate matter generated.

Activities can give rise to short-term elevated dust/PM_{10} concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

4.1 PARTICULATE MATTER

The UK Air Quality Standards seek to control the health implications of respirable PM_{10} and $PM_{2.5}$. However, the majority of particles released from construction will be greater than this in size.

Demolition works on site have the potential to elevate localised PM_{10} and $PM_{2.5}$ concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

Particulate matter is made up of a collection of solid and/or liquids materials of various sizes. The particles are released into the atmosphere by numerous sources with the major sources being created by road transport. Emissions of dust can also generate high concentrations of particulate matter.

Particulate matter requires monitoring due to the impacts on human health that large amounts of exposure can cause.

4.2 CRITERIA FOR ON-SITE PARTICULATE MATTER LEVEL

It is common practice to set Site Action levels for particulate matter (PM_{10} and $PM_{2.5}$) concentrations, as a mechanism to ensure that dust mitigation measures are both adequate and are being applied correctly. It can be useful practice for site operators to sign up to daily pollution forecasts so they become aware if moderate or high PM levels are likely; in these events additional mitigation may be applied.

4.2.1 15-Minute Monitoring Criteria

The IAQM 'Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites' October 2018 guidance states that:

> *"4.39 Historically, a Site Action Level of 250 µg/m^3, measured as a 15-minute mean PM_{10} concentration, has been widely adopted and this was cited in the 2012 IAQM Guidance. However, this metric was founded on quite limited data, and was based on a study carried out by King's College on measurement data collected at Marylebone Road during 1999-2001, and the operation of a single construction site.*

4.40 A more recent report by King's College has evaluated measurement data from nine construction sites. The monitoring was based on reference-equivalent samplers, and the analysis included 1.8 million data points. The outcome of this research recommends a Site Action Level of 190 µg/m^3, measured as a 1-hour mean. This recommendation has been reviewed and is fully endorsed by the Working Group that has drafted this IAQM Guidance.

4.41 The Site Action Levels set out below are recommended. These will be reviewed in the future as additional information becomes available

- *PM_{10} Concentrations: 190 µg/m^3 averaged over a 1-hour period.*

SPG8 Guidance (The control of dust and emissions during construction and demolition, Supplementary Planning Guidance, London Plan 2011, Implementation Framework, Mayor of London, July 2014) sets up site threshold for concentration of PM_{10} as below:

"6.4 It is recommended a trigger level of 250 µg/m^3 is set as a 15-minute mean for concentrations of PM_{10} close to construction sites. This trigger level was devised from measurement near a construction site in London using the Tapered Element Oscillating Monitor (TEOM) measurements with a multiplier of 1.3 (Fuller and Green, 2004). The multiplier of 1.3 was designed to allow for the loss of volatile PM from the TEOM which would not be an issue with construction dust. An updated correction method is now available (www.volatile-correction-model. info). The trigger level of 250 µg/m^3 would approximate to 200 µg/m^3 as a 15-minute mean without the multiplier…"

The particulate matter monitors used at the site boundary are Zephyr air quality monitor and monitors provide continuous real time data. Particulate matter monitor data can be downloaded with a resolution of 15-minute (every 15 minutes),

The action level in this assessment is set at a PM_{10} concentration of over 190 µg/m^3 over a 15-minute period for a worst-case assessment. PM_{10} levels are likely to be moderate or high If the sampled PM_{10} concentrations over a 15-minute period is above 190 µg/m^3. In these events additional mitigation will be required. A $PM_{2.5}$ concentration of 48 µg/m^3 over a 15-minute period for $PM_{2.5}$ is set as the action level.

5.0 PARTICULATE MATTER SURVEY

5.1 PARTICULATE MATTER MONITORING METHODOLOGY

Particulate Matter monitoring was undertaken using two Zephyr Monitors which are small battery-operated or solar powered monitoring devices. These devices record levels of PM_{10}, $PM_{2.5}$ and PM_1 constantly in 15-minute intervals.

The monitored results were compared to urban background monitored values of PM_{10} and $PM_{2.5}$ monitored by London Air (www.londonair.org.uk). The particulate matter background values were monitored at Havering – Rainham.

5.2 PARTICULATE MATTER MONITORING LOCATIONS

The three particulate matter monitor locations are presented in **Figure 5-1**.

Zephyr Monitor 1 is located at the site entrance and next to the site office, shown in **Figure 5-2**.

Zephyr Monitor 2 is located on the fencing along the eastern site boundary, shown in **Figure 5-3**.

Figure 5-1. Zephyr Monitor Locations

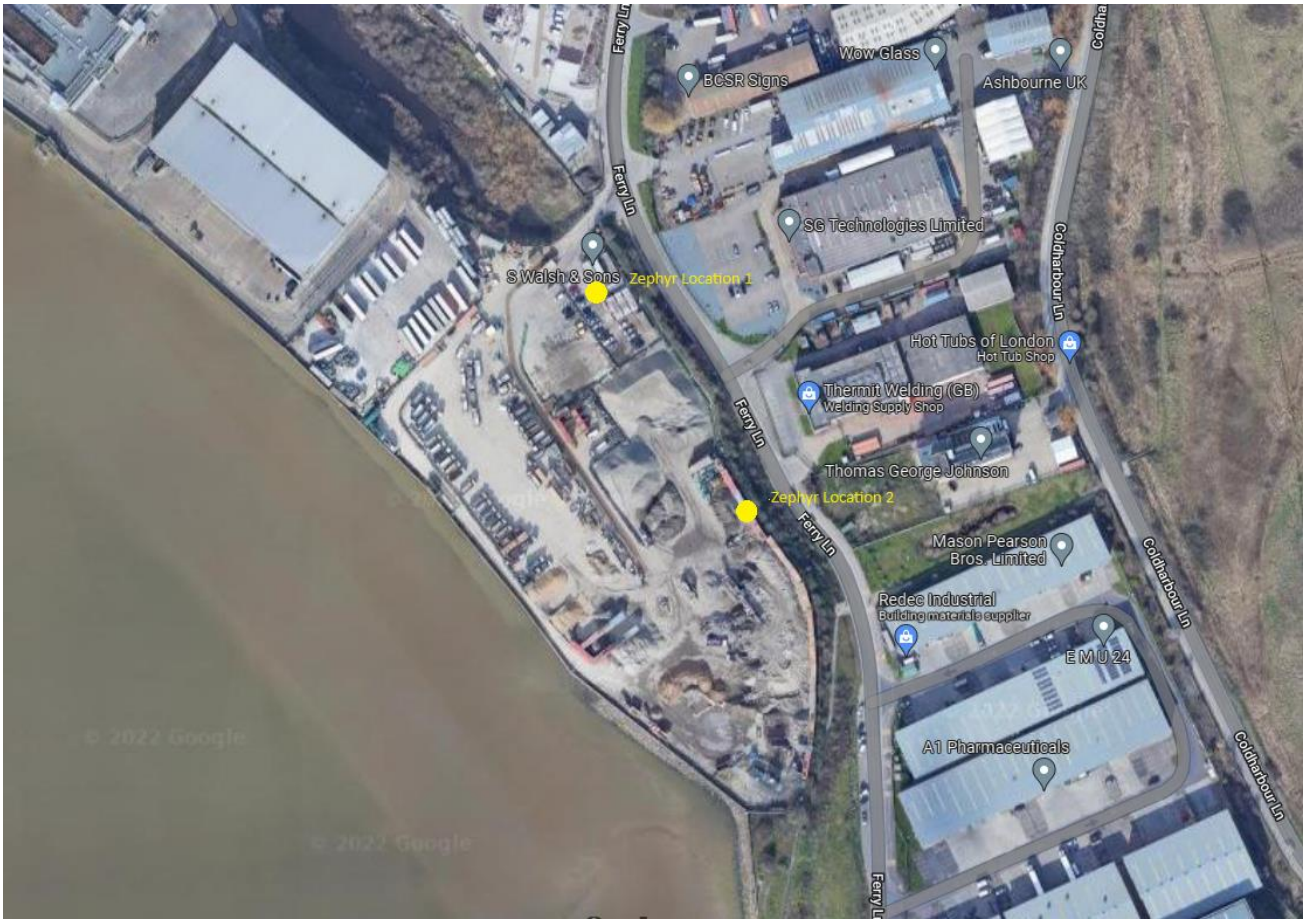


Figure 5-2. Zephyr Monitor 1 Location

Figure 5-3. Zephyr Monitor 2 Location

MONITORING LOCATION 1 RESULTS

The results of the Particulate Matter Monitoring Survey at Monitoring Location 1 are presented in the tables below.

5.2.1 Monitoring Location 1 15-Minute Criteria Analysis

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 0. These have been split into the number of exceedances within and outside of site working hours as highlighted below in **Table 5-1**.

Table 5-1. Exceedances of 15-minute Absolute Level Criteria for PM_{10}

Date	Exceedances of 'Green' Criteria		Exceedances of 'Amber' Criteria		Exceedances of 'Red' Criteria	
	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours
May-June 2022						
25/05/2022	0	0	0	0	0	0
26/05/2022	0	0	0	0	0	0
27/05/2022	0	0	0	0	0	0
28/05/2022	0	0	0	0	0	0
29/05/2022	0	0	0	0	0	0
30/05/2022	0	0	0	0	0	0
31/05/2022	0	0	0	0	0	0
01/06/2022	0	0	0	0	0	0
02/06/2022	0	0	0	0	0	0
03/06/2022	0	0	0	0	0	0
04/06/2022	0	0	0	0	0	0
05/06/2022	0	0	0	0	0	0
06/06/2022	0	0	0	0	0	0
07/06/2022	0	0	0	0	0	0
08/06/2022	0	0	0	0	0	0
09/06/2022	0	0	0	0	0	0
10/06/2022	0	0	0	0	0	0
11/06/2022	0	0	0	0	0	0
12/06/2022	0	0	0	0	0	0
13/06/2022	0	0	0	0	0	0
14/06/2022	0	0	0	0	0	0

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 0. These have been split into the number of exceedances within and outside of site working hours as highlighted below in **Table 5-2**.

Table 5-2. Exceedances of 15-minute Absolute Level Criteria for $PM_{2.5}$

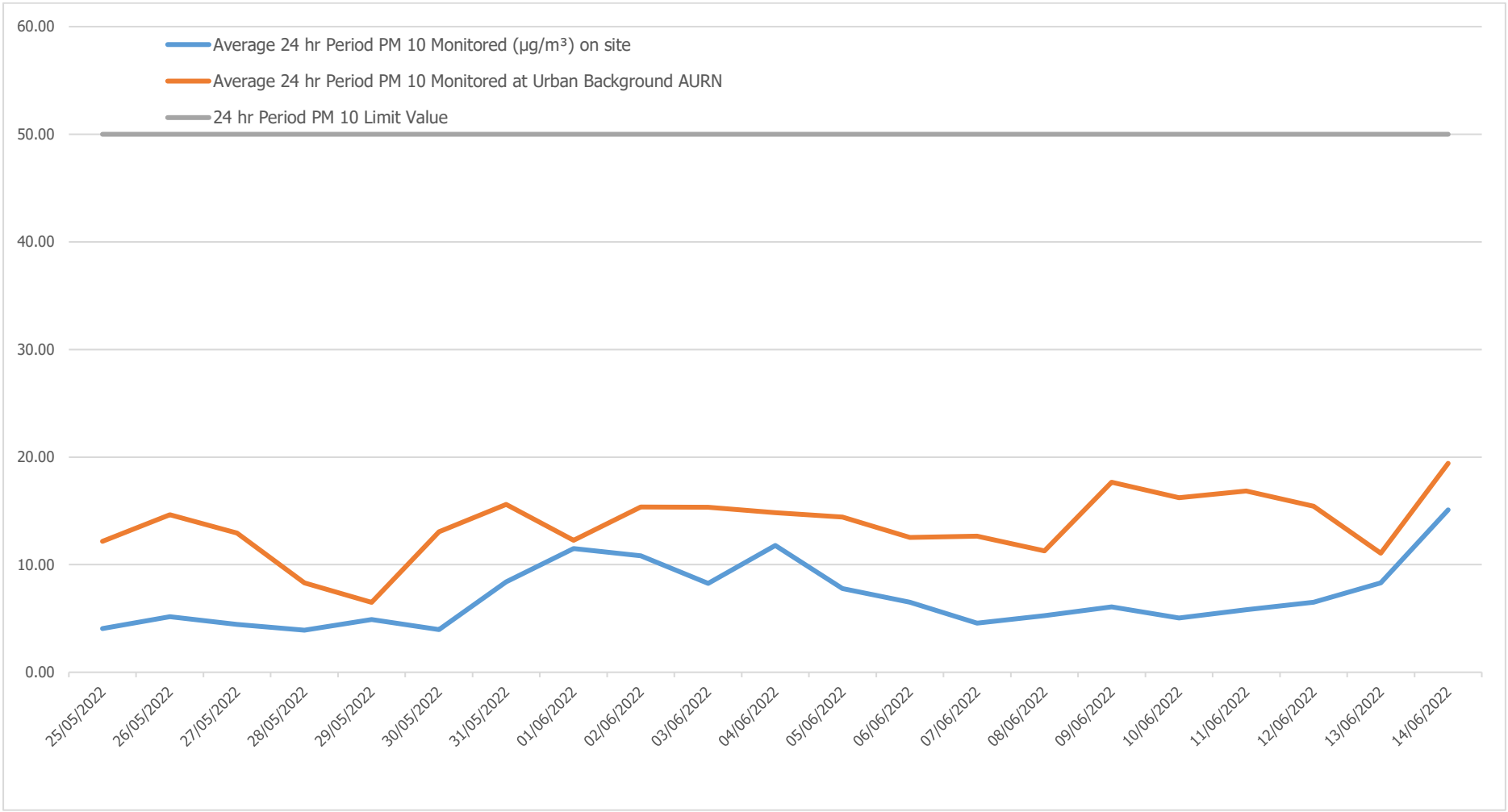
Date	Exceedances of 'Green' Criteria		Exceedances of 'Amber' Criteria		Exceedances of 'Red' Criteria	
	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours
May-June 2022						
25/05/2022	0	0	0	0	0	0
26/05/2022	0	0	0	0	0	0
27/05/2022	0	0	0	0	0	0
28/05/2022	0	0	0	0	0	0
29/05/2022	0	0	0	0	0	0
30/05/2022	0	0	0	0	0	0
31/05/2022	0	0	0	0	0	0
01/06/2022	0	0	0	0	0	0
02/06/2022	0	0	0	0	0	0
03/06/2022	0	0	0	0	0	0
04/06/2022	0	0	0	0	0	0
05/06/2022	0	0	0	0	0	0
06/06/2022	0	0	0	0	0	0
07/06/2022	0	0	0	0	0	0
08/06/2022	0	0	0	0	0	0
09/06/2022	0	0	0	0	0	0
10/06/2022	0	0	0	0	0	0
11/06/2022	0	0	0	0	0	0
12/06/2022	0	0	0	0	0	0
13/06/2022	0	0	0	0	0	0
14/06/2022	0	0	0	0	0	0

Table 5-3 below shows the monitored PM_{10} on the site compared to the closest Urban Background monitoring stations operated by the council to assess whether the PM_{10} on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 5-3. PM_{10} 24-hour monitoring results compared with background levels

Date	Average 24 hr Period PM_{10} Monitored ($\mu g/m^3$) on site	Average 24 hr Period PM_{10} Monitored at Urban Background AURN	Difference Between 24 hr Monitored Background and On Site PM_{10} (%)
May-June 2022			
25/05/2022	4.07	12.17	-67
26/05/2022	5.16	14.65	-65
27/05/2022	4.45	12.93	-66
28/05/2022	3.91	8.32	-53
29/05/2022	4.90	6.50	-25
30/05/2022	3.98	13.07	-70
31/05/2022	8.40	15.61	-46
01/06/2022	11.50	12.27	-6
02/06/2022	10.81	15.36	-30
03/06/2022	8.26	15.35	-46
04/06/2022	11.78	14.84	-21
05/06/2022	7.78	14.43	-46
06/06/2022	6.50	12.53	-48
07/06/2022	4.57	12.65	-64
08/06/2022	5.27	11.27	-53
09/06/2022	6.08	17.66	-66
10/06/2022	5.04	16.23	-69
11/06/2022	5.82	16.85	-65
12/06/2022	6.52	15.43	-58
13/06/2022	8.30	11.06	-25
14/06/2022	15.09	19.42	-22

Figure 5-4 - Comparison of On Site Monitored PM_{10} at Monitoring Location 1



5.2.2 Monitoring Location 1 and Off-Site Monitoring

As shown above, monitoring trends on site generally match trends at surrounding background monitoring sites.

Table 5-4 below shows the monitored $PM_{2.5}$ on the site compared to the closest Urban Background monitoring stations operated by the council to assess whether the $PM_{2.5}$ on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 5-4. $PM_{2.5}$ Results 24-hour monitoring results compared with background levels

Date	Average 24 hr Period $PM_{2.5}$ Monitored (µg/m³) on site	Average 24 hr Period $PM_{2.5}$ Monitored at Urban Background AURN	Difference Between 24 hr Monitored Background and On Site $PM_{2.5}$ (%)
May-June 2022			
25/05/2022	1.54	5.00	-69
26/05/2022	1.59	6.41	-75
27/05/2022	1.29	5.89	-78
28/05/2022	1.10	4.93	-78
29/05/2022	1.91	3.60	-47
30/05/2022	1.54	6.65	-77
31/05/2022	4.48	6.67	-33
01/06/2022	6.66	7.98	-17
02/06/2022	6.15	12.87	-52
03/06/2022	4.39	9.75	-55
04/06/2022	7.27	8.20	-11
05/06/2022	4.47	11.34	-61
06/06/2022	3.31	7.43	-56
07/06/2022	1.01	7.03	-86
08/06/2022	2.02	4.03	-50
09/06/2022	2.01	7.97	-75
10/06/2022	1.39	8.02	-83
11/06/2022	1.92	7.21	-73
12/06/2022	2.53	9.29	-73
13/06/2022	4.12	6.78	-39
14/06/2022	12.66	11.73	8

MONITORING LOCATION 2 RESULTS

The results of the Particulate Matter Monitoring Survey at Monitoring Location 2 are presented in the tables below.

5.2.3 Monitoring Location 2 15-Minute Criteria Analysis

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 0. These have been split into the number of exceedances within and outside of site working hours as highlighted below in **Table 5-5**.

Table 5-5. Exceedances of 15-minute Absolute Level Criteria for PM_{10}

Date	Exceedances of 'Green' Criteria		Exceedances of 'Amber' Criteria		Exceedances of 'Red' Criteria	
	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours
May-June 2022						
25/05/2022	0	0	0	0	0	0
26/05/2022	0	0	0	0	0	0
27/05/2022	0	0	0	0	0	0
28/05/2022	0	0	0	0	0	0
29/05/2022	1	0	0	0	0	0
30/05/2022	0	0	0	0	0	0
31/05/2022	0	0	0	0	0	0
01/06/2022	0	0	0	0	0	0
02/06/2022	0	0	0	0	0	0
03/06/2022	0	0	0	0	0	0
04/06/2022	0	0	0	0	0	0
05/06/2022	0	0	0	0	0	0
06/06/2022	0	0	0	0	0	0
07/06/2022	0	0	0	0	0	0
08/06/2022	0	0	0	0	0	0
09/06/2022	0	0	0	0	0	0
10/06/2022	0	0	0	0	0	0
11/06/2022	0	0	0	0	0	0
12/06/2022	0	0	0	0	0	0
13/06/2022	0	0	0	0	0	0
14/06/2022	0	0	0	0	0	0

The on-site monitoring results have been further analysed to determine any exceedances of the 15-minute traffic criteria outlined in Section 0. These have been split into the number of exceedances within and outside of site working hours as highlighted below in **Table 5-6**.

Table 5-6. Exceedances of 15-minute Absolute Level Criteria for $PM_{2.5}$

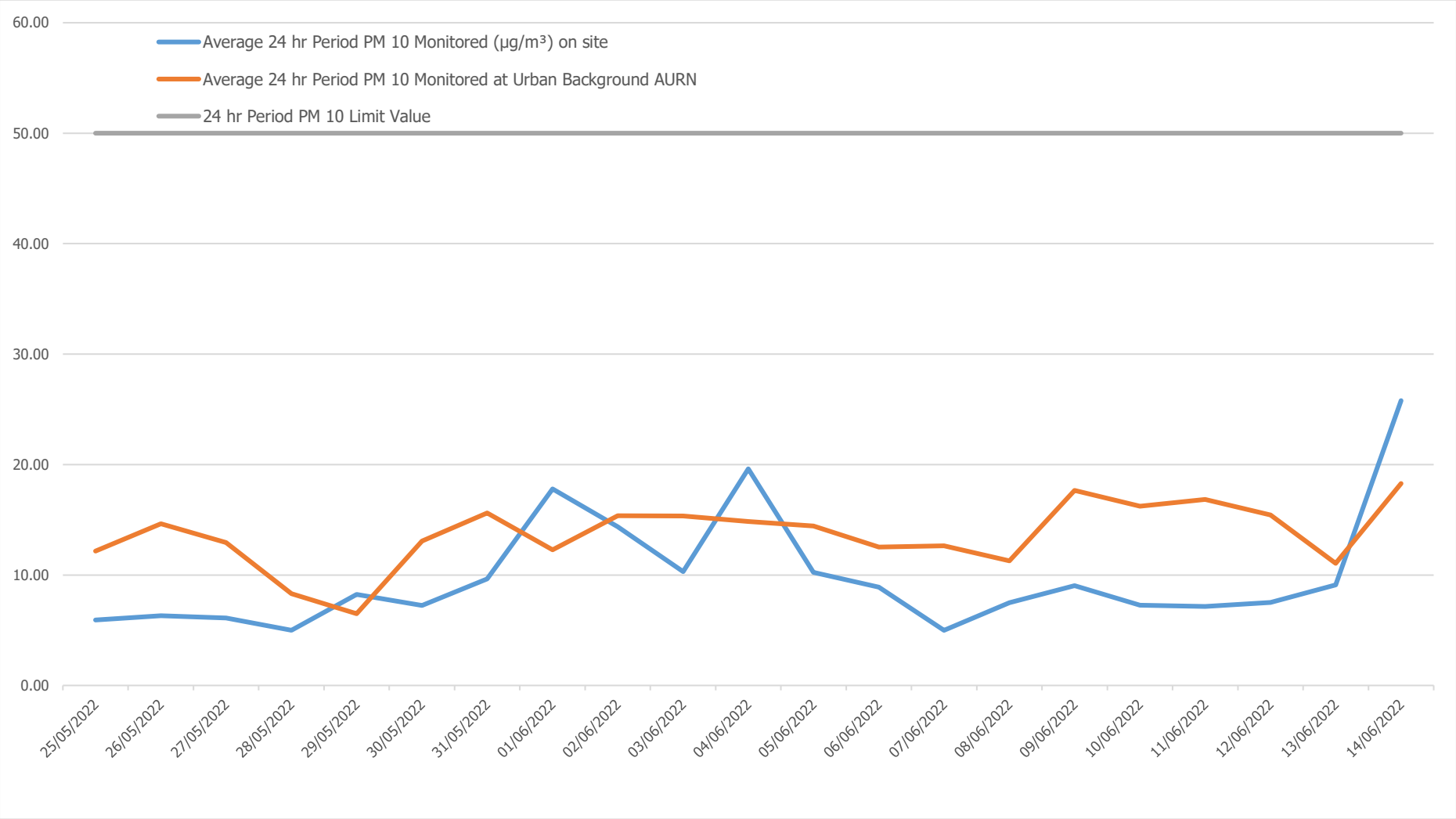
Date	Exceedances of 'Green' Criteria		Exceedances of 'Amber' Criteria		Exceedances of 'Red' Criteria	
	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours	Within Working Hours	Outside Working Hours
May-June 2022						
25/05/2022	0	0	0	0	0	0
26/05/2022	0	0	0	0	0	0
27/05/2022	0	0	0	0	0	0
28/05/2022	0	0	0	0	0	0
29/05/2022	1	0	0	0	1	0
30/05/2022	0	0	0	0	0	0
31/05/2022	0	0	0	0	0	0
01/06/2022	0	0	0	0	0	0
02/06/2022	0	0	0	0	0	0
03/06/2022	0	0	0	0	0	0
04/06/2022	0	0	0	0	0	0
05/06/2022	0	0	0	0	0	0
06/06/2022	0	0	0	0	0	0
07/06/2022	0	0	0	0	0	0
08/06/2022	0	0	0	0	0	0
09/06/2022	0	0	0	0	0	0
10/06/2022	0	0	0	0	0	0
11/06/2022	0	0	0	0	0	0
12/06/2022	0	0	0	0	0	0
13/06/2022	0	0	0	0	0	0
14/06/2022	0	0	0	0	0	0

Table 5-7 below shows the monitored PM_{10} on the site compared to the closest Urban Background monitoring stations operated by the council to assess whether the PM_{10} on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 5-7. PM_{10} 24-hour monitoring results compared with background levels

Date	Average 24 hr Period PM_{10} Monitored ($\mu g/m^3$) on site	Average 24 hr Period PM_{10} Monitored at Urban Background AURN	Difference Between 24 hr Monitored Background and On Site PM_{10} (%)
May-June 2022			
25/05/2022	5.93	12.17	-51
26/05/2022	6.31	14.65	-57
27/05/2022	6.12	12.93	-53
28/05/2022	5.00	8.32	-40
29/05/2022	8.25	6.50	27
30/05/2022	7.24	13.07	-45
31/05/2022	9.65	15.61	-38
01/06/2022	17.80	12.27	45
02/06/2022	14.37	15.36	-6
03/06/2022	10.31	15.35	-33
04/06/2022	19.60	14.84	32
05/06/2022	10.25	14.43	-29
06/06/2022	8.90	12.53	-29
07/06/2022	4.99	12.65	-61
08/06/2022	7.50	11.27	-33
09/06/2022	9.04	17.66	-49
10/06/2022	7.26	16.23	-55
11/06/2022	7.14	16.85	-58
12/06/2022	7.53	15.43	-51
13/06/2022	9.11	11.06	-18
14/06/2022	25.79	18.28	41

Figure 5-5. Comparison of On Site Monitored PM_{10} at Monitoring Location 2



5.2.4 Monitoring Location 2 and Off-Site Monitoring

As shown above, monitoring trends on site generally match trends at surrounding background monitoring sites.

Table 5-8 below shows the monitored $PM_{2.5}$ on the site compared to the closest Urban Background monitoring stations operated by the council to assess whether the $PM_{2.5}$ on site is being distributed in a pattern similar to the local area and to identify any anomalous results.

Table 5-8. $PM_{2.5}$ Results 24-hour monitoring results compared with background levels

Date	Average 24 hr Period $PM_{2.5}$ Monitored (µg/m³) on site	Average 24 hr Period $PM_{2.5}$ Monitored at Urban Background AURN	Difference Between 24 hr Monitored Background and On Site $PM_{2.5}$ (%)
May-June 2022			
25/05/2022	4.15	5.00	-17
26/05/2022	4.94	6.41	-23
27/05/2022	5.07	5.89	-14
28/05/2022	4.14	4.93	-16
29/05/2022	6.12	3.60	70
30/05/2022	5.66	6.65	-15
31/05/2022	8.10	6.67	21
01/06/2022	14.84	7.98	86
02/06/2022	12.32	12.87	-4
03/06/2022	8.51	9.75	-13
04/06/2022	15.34	8.20	87
05/06/2022	7.99	11.34	-30
06/06/2022	7.03	7.43	-5
07/06/2022	3.55	7.03	-50
08/06/2022	5.54	4.03	38
09/06/2022	6.47	7.97	-19
10/06/2022	5.34	8.02	-33
11/06/2022	5.87	7.21	-19
12/06/2022	6.52	9.29	-30
13/06/2022	7.77	6.78	15
14/06/2022	20.10	10.06	100

Table 5-9. Comparison of Weather Conditions and average levels of PM_{10} and $PM_{2.5}$

Date	Wind Directions	Wind Speed (km/h)	Weather Conditions	Average 24 hr Period PM_{10} Monitored ($\mu g/m^3$) on site	Average 24 hr Period $PM_{2.5}$ Monitored ($\mu g/m^3$) on site
May-June 2022					
25/05/2022	SSE	14	Fair	4.07	1.54
26/05/2022	West-South-West	14	Cloudy	5.16	1.59
27/05/2022	North-West	9	Fair	4.45	1.29
28/05/2022	North-East	7	Fair	3.91	1.10
29/05/2022	North	6	Fair	4.90	1.91
30/05/2022	South	7	Fair	3.98	1.54
31/05/2022	West	7	Fair	8.40	4.48
01/06/2022	West	5	Fair	11.50	6.66
02/06/2022	Various	6	Fair	10.81	6.15
03/06/2022	East-North-East	9	Fair	8.26	4.39
04/06/2022	East-North-East	12	Fair	11.78	7.27
05/06/2022	North	5	Cloudy	7.78	4.47
06/06/2022	West-South-West	8	Cloudy	6.50	3.31
07/06/2022	South-South-West	7	Fair	4.57	1.01
08/06/2022	West	14	Fair	5.27	2.02
09/06/2022	West	11	Fair	6.08	2.01
10/06/2022	South-West	12	Mostly Cloudy	5.04	1.39
11/06/2022	West-South-West	12	Fair	5.82	1.92
12/06/2022	West	10	Fair	6.52	2.53
13/06/2022	West	7	Fair	8.30	4.12
14/06/2022	South-South-West	6	Fair	15.09	12.66

6.0 MONITORING SUMMARY

This report contains onsite monitoring results at two locations between 25th May 2022 and 14th June 2022

Monitoring Location 1

PM_{10}

The data from the first period of monitoring at the Frog Island site at Monitoring Location 1 showed no exceedances of the 'green', 'amber' or 'red' criteria.

$PM_{2.5}$

The data from the first period of monitoring at the Frog Island site at Monitoring Location 1 showed no exceedances of the 'green', 'amber' or 'red' criteria.

Monitoring Location 2

PM_{10}

The data from the first period of monitoring at the Frog Island site at Monitoring Location 2 showed one exceedance of the 'green' criteria, and no exceedances of the 'amber' or 'red' criteria.

$PM_{2.5}$

The data from the first period of monitoring at the Frog Island site at Monitoring Location 2 showed one exceedance of the 'green' and one exceedance of the 'red' criteria. There was no exceedance of any 'amber' criteria.

- The 'red' exceedance occurred at 11:00am on 29th May 2022 during site hours. However, the 15-minute monitoring period directly before and after saw no exceedances and were well below the site action limit. As such, the 'red' exceedance at Monitoring Location 2 is considered to be an anomalous result relating to external factors, rather than on-site activities.

APPENDIX A - FIGURES

Figure A-1 Monitoring Locations

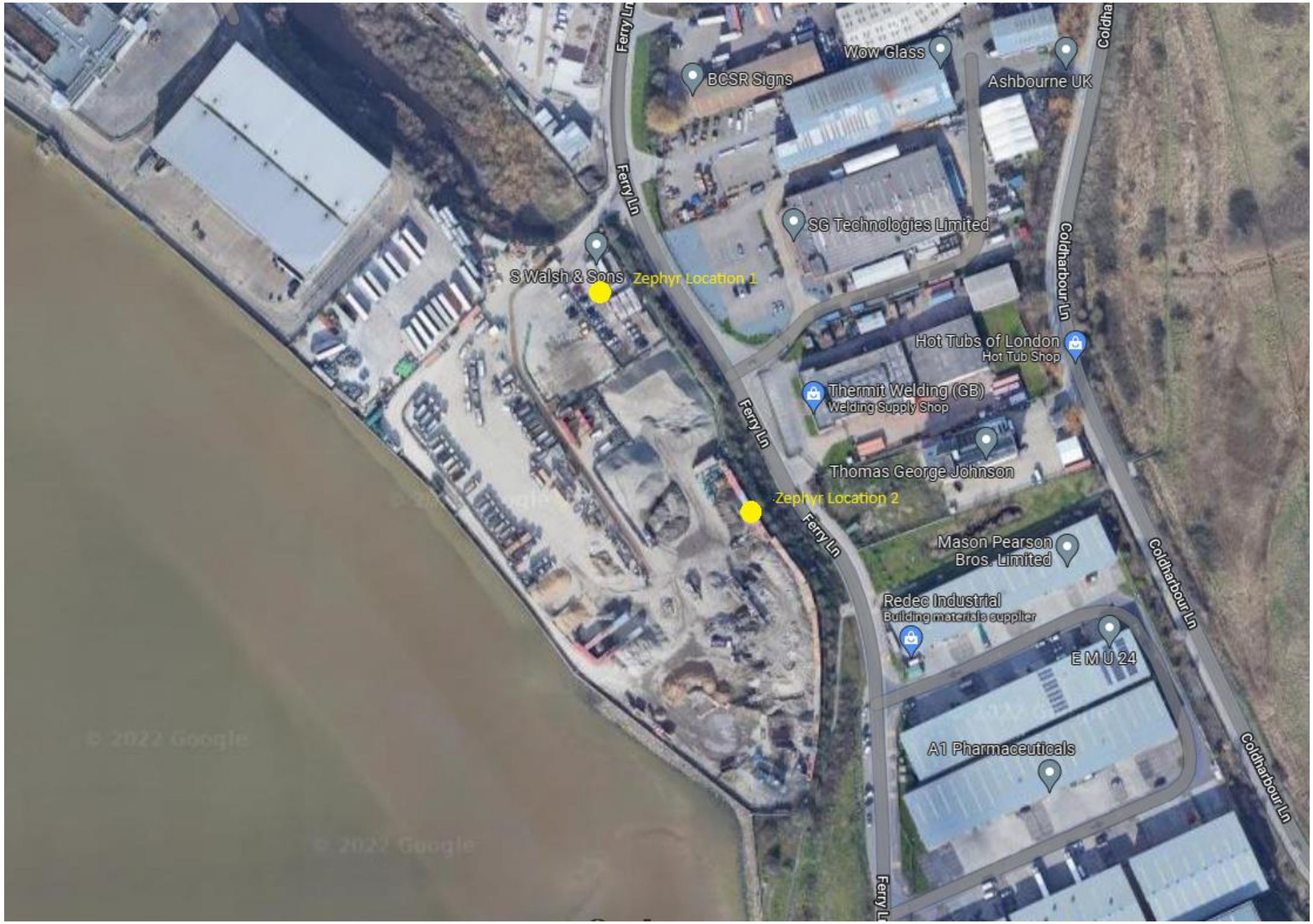
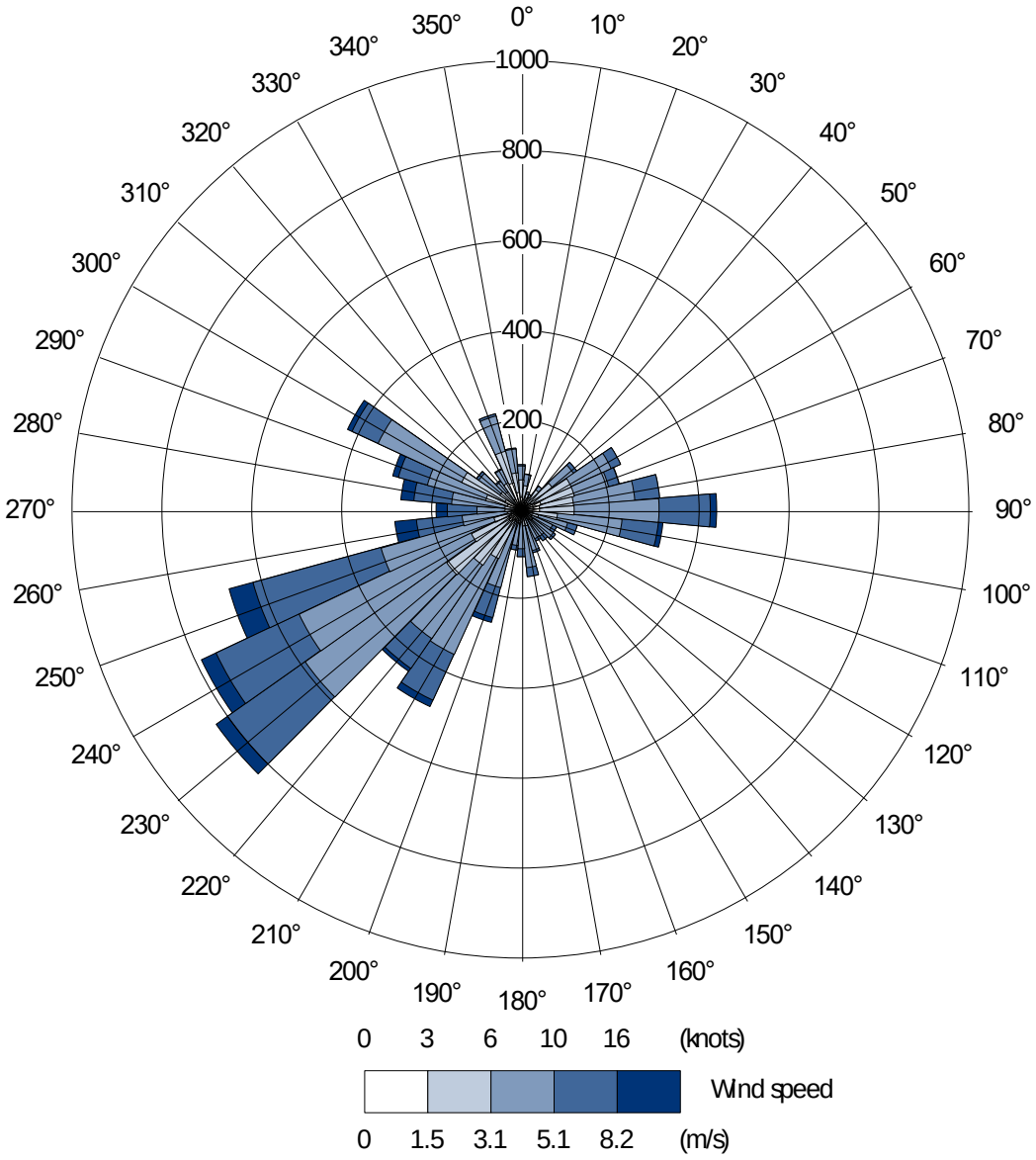


Figure A-6-2. London City Airport 2019 Meteorological Wind Rose



APPENDIX B - RED CRITERIA EXCEEDANCES

An assessment using the traffic light approach based on Sections 0 and the IAQM document '*Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*' (2018) was conducted for the site. The in-detail results with the date, time and recorded PM_{10} levels over 190 and $PM_{2.5}$ levels over 48 are outlined in below. These are regarded as "red" level.

There were no exceedances of any criteria of either the PM_{10} or $PM_{2.5}$ limits at Monitoring Location 1

Table A1 Date and Time of $PM_{2.5}$ Red Limit Exceedances at Monitoring Location 2

Date	Time	PM_{10} (µg/m³)	Recorded Weather Conditions	Wind Speeds (km/h)
29/05/2024	11:00	63.31	Fair	6.0

APPENDIX C - REPORT TERMS & CONDITIONS

This Report has been prepared using reasonable skill and care for the sole benefit of L&R (London & Regional) ("the Client") for the proposed uses stated in the report by Tetra Tech Limited ("Tetra Tech"). Tetra Tech exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

No liability is accepted, or warranty given for; unconfirmed data, third party documents and information supplied to Tetra Tech or for the performance, reliability, standing etc. of any products, services, organisations or companies referred to in this report. Tetra Tech does not purport to provide specialist legal, tax or accounting advice.

The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including; its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. Tetra Tech accept no liability for issues with performance arising from such factors.

APPENDIX D – DUST MANAGEMENT PLAN – PDE CONSULTING – MAY 2018

DUST MANAGEMENT PLAN

for Operation of a Waste Facility at

Frog Island, Ferry Lane South, Rainham, Essex,
RM13 9JY

Report prepared on behalf of:
S Walsh and Son Limited

Report Date:
May 2018

This Dust Management Plan was prepared by PDE Consulting Limited on behalf of S Walsh and Son Limited

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Dust Management Plan – Version Log

Version No.	Version date	Description
Original	December 2016	Original Dust Management Plan (DMP).
V2	November 2017	Full review of DMP following EA site visit on 22/09/2017 and recommendations on subsequent CAR form.
V3	May 2018	Update with enhanced mitigation measures recently installed on Site, e.g. dust netting. Also references to an air quality monitoring report provided by the EA.

CONTENTS

TABLES

DRAWINGS

APPENDICES

1. INTRODUCTION

Background

1.1 This Dust Management Plan (DMP) has been prepared by PDE Consulting Limited (the 'Agent') on behalf of S Walsh and Son Limited (the 'Operator') for their permitted waste facility at Frog Island (the 'Site').

1.2 The Site is situated off Ferry Lane in Rainham, Essex and is approximately 1.6 km to the south west of Rainham town centre within an industrial estate. The Site is at an elevation of approximately 5mAOD and is bound on three sides by the industrial estate. The River Thames is located to the south west of the Site. There are no residential receptors within 1 km of the Site.

1.3 The Site is accessed via Ferry Lane which leads to the A13 approximately 620 m to the north east of the Site. The Site and permit boundary are shown on Drawing Number 3655-SK-160219.

1.4 Environmental permit number EPR/EB3004CE was issued on 11 July 2016 for the operation of a waste recycling facility. The permit authorises the Operator to accept, store and treat up to 209,000 tonnes per annum of construction and demolition waste to produce soil, soil substitutes and aggregate. Treatment consists of crushing and occasional screening only.

1.5 Following a Site visit in October 2016, the EA requested an emissions management plan in accordance with Condition 3.1.2(a) of the permit. This DMP has been updated following a further Site visit by the EA in March 2018.

1.6 The Site is located within the London Borough of Havering in an Air Quality Management Area (AQMA) for Nitrogen dioxide (NO2), and Particulate Matter (PM10). The London Borough of Havering AQMA was declared in September 2006. The source of the pollution is reported to be road traffic.

1.7 This report provides details of the mitigation measures in place to mitigate fugitive dust emissions from the Site causing pollution. It has been completed in accordance with the following EA guidance:

- https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit;
- Technical guidance note M17 Monitoring Particulate Matter in Ambient Air around Waste Facilities (Version 2);
- Example Dust & Particulate Emissions Management Plan (version 6).

Implementing the DMP

1.8 The Site foreman, reporting to the TCM, has the responsibility of ensuring that the procedures in this DMP are adhered to.

1.9 The Site foreman will ensure that all members of staff are aware of the site dust management procedures and a copy of this DMP will be kept on Site.

1.10 The Site foreman will have the authority to modify or stop operations to reduce emissions on a temporary or permanent basis.

Review of the DMP

1.11 This DMP will be reviewed as follows:

- When changes are made to your Site, operations or equipment that affect the activities covered by your permit;
- Whenever an application is made to change ('vary') the permit;
- After any accident, complaint or breach of your permit; and
- If a new environmental problem or issue is encountered, and you have implemented new measures to control it.

1.12 Any revisions or changes will be logged in the revision history table at the beginning of the document.

2. OPERATIONS

Nature of the Operations

2.1 The permit allows for the importation, storage and treatment of up to 209,000 tonnes of waste per year to produce soil, soil substitutes and aggregate. Treatment consists of crushing and screening only.

2.2 Plant used on Site comprises:

- A 360 tracked excavator;
- A screening unit - not currently on site, brought to Site as required;
- A crusher;
- A loading shovel; and
- A wheel wash.

2.3 The loading shovel is only used for collecting material from the crusher belt and loading outbound lorries. The loading shovel operates 10 hours per day.

2.4 The crusher is a Sandvik QJ340 model with a drop height 2.56 m. The crusher can process some 100 – 200 tonnes of material per hour and is operated between the hours of 07.00 to 17.00 Monday to Friday.

2.5 Drawing No 024-022-Frog Island_SK05 shows the location of the stockpiles of processed and unprocessed materials.

2.6 Drawing No 024-022-Frog Island_SK05 also shows the location of the wheel wash.

2.7 The majority of wastes are treated in accordance with the WRAP Quality Protocol: 'End of waste criteria for the production of aggregates from inert waste'. Small volumes of residual waste (e.g. metal) are removed from Site for recovery or disposal at suitably permitted facilities.

2.8 All wastes will be stored and treated on hardstanding.

2.9 Wastes are imported to the Site by road in sheeted heavy goods vehicles (HGV). All wastes are visually inspected on receipt of the Site.

2.10 Identified sources for dust emissions from the Site are:

- Fugitive emissions from vehicle movements on Site and on the public highway;
- Loading and unloading of waste material;
- Movement of waste materials around the Site;
- Treatment of waste by crushing and screening, including wastes dropping from conveyors into stockpiles;
- Waste stockpiles;
- All site surfaces (including roads); and
- Exhaust emissions.

2.11 Mitigation measures are proposed in Section 4.

Pathway

2.12 Unlike many other atmospheric pollutants, the generation of fugitive dust is particularly dependent upon weather conditions and the nature of the operations.

2.13 The prevailing meteorological conditions at any site will be dependent upon many factors, including its location in relation to macroclimatic conditions as well as more site specific, microclimatic conditions. The most significant meteorological factor is the predominant wind direction and wind speeds. Consequently data has been collected regarding the predominant wind speeds and directions appropriate to the Site conditions.

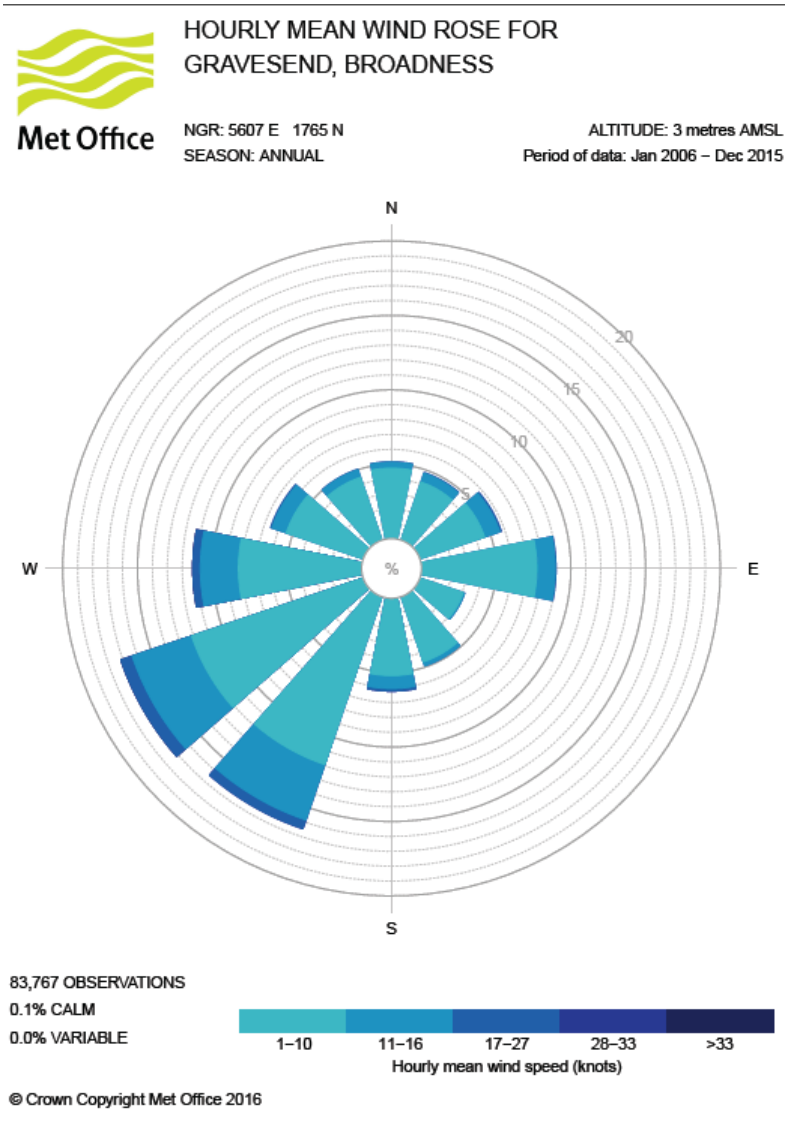
Local Wind Speeds and Directions

2.14 Wind speed and direction data have been obtained from the Gravesend observing station for the period from 2006 to 2015. Gravesend observing station is located approximately 9.5km south east of the Site. The data from Gravesend is considered suitable as it is located on the River Thames and at 3m Above Mean Sea Level (AMSL), it is a similar elevation to the Site.

2.15 The wind rose for London City Airport located some 7.5 km east of the Site shows similar patterns to that of Gravesend.

2.16 Wind speed and direction data from this observing station are appropriate for characterisation of the wind climate at the Site and are presented as a wind rose in Figure 1.

Figure 1: Hourly mean wind rose, Gravesend, Broadness 2006-2015



2.17 The predominant wind directions are from the south western quarter. It is calculated that the wind originating from the southwest accounts for approximately 35% of all wind. The next most predominant wind direction is from the west, at a frequency of 12%. Wind directions from the east and northwest sectors occur relatively infrequently. Calm conditions (<0.5 m s-1) are apparent for 0.1 % of the time.

2.18 Winds exceeding 13 mph are taken to be capable of entraining dust from surfaces. Wind exceeding speeds of 13 mph occur 20% of the time. Winds from the south southwest are most prevalent, blowing in this direction 17% of the time, with winds exceeding 13 mph for 5% of that time.

Existing Air Quality

2.19 The EA provided a copy of their report entitled Study of Ambient Air Quality at Rainham 1 April 2017 to 16 August 2017 (Report Reference AAM/TR/2017/10).

2.20 This report provides the results from the study of ambient air quality in the vicinity of Ferry Lane, in Rainham. The report presents the measured levels of particulate (PM10 and PM2.5) and the oxides of Nitrogen (NOX and NO2) and compares these levels with the objectives of the UK Air Quality Strategy (AQS) where applicable.

2.21 The EA's Ambient Air Monitoring Team (AAMT) deployed its mobile monitoring facility (MMF10) on the grounds of Thermit Welding GB Ltd on Ferry Lane in Rainham which is located 45m east of the Site. The report concluded that:

*"Comparison of the PM_{10} data with the AQS objective for the 24-hour (midnight-midnight) mean indicated that the current standard **would not be exceeded** at the monitoring site.*

*The mean PM_{10} concentration over the monitoring period at the monitoring site was 24.6µg/m3. If the assumption is made that the conditions during the monitoring period were representative of a typical year, then the results would indicate that the AQS annual mean objective of 40µg/m3 **would not be exceeded** at the monitoring site.*

*The mean $PM_{2.5}$ concentration over the monitoring period was 8.90µg/m3. If the assumption is made that the conditions during the monitoring periods were representative of a typical year, then the results would indicate that the AQS annual mean objective for $PM_{2.5}$ of 25µg/m3 **would not be exceeded** at the monitoring site".*

2.22 However, it was noted in the report that pollution rose analysis indicates that the highest average PM10 concentrations measured at MMF10 were from a wind direction of 260° - 310°. The EA state that a possible source in this wind sector is the Site.

3. RECEPTORS

3.1 Sensitive locations are those where the public and habitats may be exposed to airborne emissions from the Site.

3.2 The distance from the source to the receptor location plays an important role in the potential impact experienced as airborne dust, dust deposition rates. Detection concentrations fall off rapidly with increasing distance from the source, however, local sources of wind such as downward exhausts, blowers, wind tunnelled and or channelled because of topography and movements of vehicles and moving parts create local wind are also considered.

3.3 The very largest dust particles usually only travel 10-20 m before being deposited, and the vast majority of dust is deposited within 100 m of the source.

3.4 As a large proportion of the surrounding area is used for commercial and industrial purposes, the majority of the areas around the site are not considered sensitive in the context of air quality.

3.5 Table 1 summarises the closest receptors. Table 2 summarises other dust emitting operators in the immediate area.

Table 1: Receptors

Receptor	Receptor type	Distance from Site (m)	Direction from Site	Relevant wind direction	% time wind (>13 mph) towards receptor
River Thames	Water body	0	South west	NNE, ENE, E, ESE	3
Rainham Creek	Water body	5	North	S, SSE	1.5
Total Food Distribution	Industrial (work place)	10	North east	S, SSW	6.5
Shanks Municipal Waste Management	Industrial (work place)	20	North	SSE	0.5
Thermit Welding (and commercial properties on Ferry Lane)	Industrial (work place)	45	East	SSW, WSW, W, WNW, NNW	15
Inner Thames Mashes / Rainham Marshes	SSSI / LNR	150	East	SSW, WSW, W, WNW, NNW	15
Track/footpath	Pedestrian users	400	East	NNW, WNW, W, WSW	10

Table 2: Other Dust Emitting Operators

Company	Address	Type of business	Potential Source of emissions	Distance from Site (m)	Direction
Shanks	Frog Island, Creek Way	Municipal waste management	Fugitive emissions from vehicle movements and point source emissions from exhausts.	20	North west
Total Food Distribution	Unit 10 Easter Industrial Park, Ferry Lane South, Rainham	Hauliers		10	North east
Hoffman Thornwood	Ferry Lane, Rainham	Manufacturer		110	South east

3.6 The Inner Thames Marshes Site of Special Scientific Interest (SSSI) and Rainham Marshes Local Nature Reserve (LNR) are situated 150 m east of the Site.

3.7 The Inner Thames Marshes form the largest remaining expanse of wetland bordering the upper reaches of the Thames Estuary. The site is of particular note for its diverse ornithological interest and especially for the variety of breeding birds and the numbers of wintering wildfowl, waders, finches and birds of prey, with wintering teal populations reaching levels of international importance. The Marshes also support a wide range of wetland plants and insects with a restricted distribution in the London area, including some that are nationally rare or scarce. In November 2009 the Site was recorded as being in an unfavourable and declining condition.

3.8 The Rainham Marsh LNR is designated as part of the Inner Thames SSSI.

Potential Impact of Dust Emissions on Receptors

3.9 The closest residential receptors are greater than 1 km away and have not been considered in this assessment.

3.10 Members of the general public near the site i.e. users of footpaths and River Thames may be adversely affected by dust emissions from the Site. However as the users will be transient, they are not considered to be sensitive receptors in this assessment.

3.11 Receptors within 200 m are conservatively considered to be sensitive to dust and PM10.

3.12 Properties to the east of the Site along Ferry Lane are downwind and are therefore most at risk of the effects from dust from the Site. The closest property to the Site, Thermit Welding, is located 45m from the Site boundary. The type of industry is not considered to have a high sensitive to dust emissions. The employees of the business are considered to be sensitive receptors, however, they will be located indoors for the majority of the time and transient only, when entering and exiting the premises. The greatest risk to the business is deposited dust fouling employee cars. Winds capable of entraining dust (>13 mph), blow towards this receptor just 15% of the time. The mitigation measures detailed in Section 4 serve to minimise off Site emissions.

3.13 Other businesses along Ferry Lane are of similar low sensitivity to dust and at increasing distances from the Site. Together with the mitigation measures proposed, it is expected that these properties and the employee's therein, are at low risk of being adversely affected by dust from the waste facility.

3.14 Given the distance of the SSSI and LNR from the Site (>150m), the fact that the majority of dust will have been deposited before reaching the receptor, these Sites are considered to be at low risk of being adversely impacted by dust emissions from the facility.

3.15 Commercial properties to the north of the Site are subject to winds capable of entraining dust <1% of the time and are considered to be at very low risk of adverse impact from dust from the Site. Businesses immediately to the north are themselves potentially dusty operations (municipal waste management facility and a distribution depot) and are not considered to be sensitive receptors. Employees at these locations are at very low risk of experiencing dust emissions from the Site due to the very low incidence of winds capable of entraining dust (pathway), blowing in this direction.

3.16 The River Thames and Rainham Creek are considered less sensitive receptors than residential or commercial properties, however, smothering could occur if excessive dust is emitted from the Site. Winds capable of entraining dust (>13 mph) occur just 1.5 % of the time towards thesereceptors and both are considered at very low risk of adverse effects from the Site.

4. MITIGATION AND MONITORING

Mitigation Measures

4.1 This section sets out the measures that are employed to mitigate the potential adverse effect on air quality at nearby receptors predicted as a result of the operations. The effects on air quality are expected to relate mainly to the generation of dust from HGV traffic and the processing and storage of dry materials.

4.2 The mitigation measures set out in Table 3 below seek to break the source-pathway-receptor linkage, and are considered to be best practice within the industry.

Table 3: Summary of mitigation measures

Abatement Measure	Description / Effect	Use on Site
Hardstanding or unmade ground.	Creating a hard surface as opposed to unmade (rocky or muddy) ground within the site and on site haul roads. This will reduce the amount of dust generated at ground level by vehicles and site activities.	The entire Site is surfaced in hardstanding or concrete to allow easy cleaning and prevent wind-whipping. The Site access road is concreted between the wheel wash and the public highway. There are regular inspections and maintenance of hard surfaces.
Installed wheel wash	Provides a high pressure wash of vehicle wheels and lower parts (including under body) using a series of jet sprays. More effective if vehicles drive through the wheel wash slowly in order that there is sufficient time for dirt to be removed.	A wheel wash has been installed. All drivers are instructed to progress through the wheel wash at a sufficiently slow pace to ensure thorough cleaning. Any drivers not using the wheel wash appropriately will be subject to disciplinary action. There is a concreted road between the wheel wash and the public highway to reduce track out of mud.
Reduction in operations (waste throughput, vehicle size, operational hours).	Reducing the amount of activity on site as well as associated traffic movements should result in reduced emissions and re-suspension of particulates from a site.	The operation has been sized appropriately, with particular regard to dust, noise and vehicle movements. Less than half of the permitted area is currently used for waste activities. Annual throughputs are limited by the permit to 209,000 tonnes per annum.
Minimising drop heights for waste.	Minimising the height at which waste is handled will reduce the distance over which debris and particulates could be blown and dispersed by winds.	Drop heights from crusher, screener and vehicles will be kept to a minimum. Maximum drop height will be from the screener, approximately 2.56m.
Sheeting of vehicles	Prevents the escape of debris, dust and particulates from vehicles as they travel.	All vehicles delivering and exporting potentially dusty wastes or material to or from the Site will be sheeted.
Minimising waste storage heights	Minimising the height at which waste is	The stockpiles are maintained below

and volumes on site	handled will reduce the distance over which debris and particulates could be blown and dispersed by winds. Reducing storage volumes should reduce the surface area over which particulates can be mobilised.	the height of the dust netting. Stockpiles will be a maximum height of 3m.
Ceasing operation during high winds, exceptionally dry conditions and/or prevailing wind direction.	Mobilisation of dust and particulates is likely to be greater during periods of strong winds or exceptionally dry conditions and hence ceasing or reducing operation at these times may reduce dusty events.	To be assessed following daily checks for dust emissions beyond the site boundary, particularly during these conditions. If visible dust emissions can be seen to cross the site boundary despite the employed mitigation measures, operations will be reduced or ceased.
Site speed limit, 'no idling' policy and minimisation of vehicle movements on site.	Reducing vehicle movements and idling will reduce emissions from vehicles. Enforcement of the speed limit will reduce re-suspension of particulates by vehicle wheels.	All vehicles. The Site speed limit of 5mph will be enforced. Drivers observed to be travelling above the speed limit will be subject to disciplinary action.
Remedial Measures		
The use of dust netting.	Installation of netting to capture released debris and dust / particulates prior to it being dispersed off-site.	Dust netting has been installed on the north east boundary of the Site.
An adequate supply of water for spray equipment (bowser, hoses and/or mist sprays) is maintained to ensure that the rate of application would be sufficient for the purpose of dampening ground surfaces, materials in stockpiles and dusty waste prior to tipping.	To minimise fugitive emissions on internal haul roads and access roads. To prevent the re-suspension of dust from un-paved areas, by the action of moving vehicles. To minimise fugitive emissions from stockpile	Surfaces and stockpiles will be dampened as required and without saturating, so as to prevent off site dust emissions. A bowser is used on site daily to wet surfaces. A mobile dust suppression unit (Portable Independent Rotary Unit (PIRU)) is used on site and is repositioned based on site activities and prevailing wind direction. The PIRU will be positioned at the dust source to be effective. The specification for the PIRU is provided in Appendix 1.
Application of CMA / chemical suppressant	Diluted Calcium Magnesium Acetate (CMA) or other chemical based dust suppressant is regularly applied and acts as a suppressant with the aim of reducing dust and particulate re-suspension and hence ambient concentrations.	Chemical additive being used in dust suppression system. DustMac99 has been developed to enhance the "wetting" properties of water. Adding wetting agents to water reduces the surface tension thereby improving its ability to wet particles. The specification and the safety sheet for the DustMac99 wetting agent is provided in Appendix 2.
Road sweepers	Road sweeping vehicles damp down dusts	Employed twice daily on the concrete

	whilst brushing and collecting dust and particulates from the road surface, particularly at the kerbside.	road between the wheel wash and the public highway to prevent transport of dusty material onto public highway.
Use crushing and screening plant within their design capacity and maintaining good standards of all plant and equipment.	To minimise dust emissions during the mineral processing process	All relevant plant.
Good Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	All staff
Staff training	Provide training to the site personnel on dust mitigation. Training should also cover 'emergency preparedness plans' to react quickly in case of any failure of the planned dust mitigation.	All staff.
Communication	Maintain good communication to help alleviate anxieties between the Operator and the surrounding communities.	All staff

Monitoring

4.3 Visual inspections of the following will be undertaken by the Site Manager or his nominee during each working day as set out in Table 4.

Table 4: Dust Monitoring

Location	What are you looking for?	Actions
Site boundaries	Check for fugitive dust emissions across boundary.	See Dust Action Plan (DAP) below.
Site access roads and haul roads	Check for wind whipping of surfaces, do they require damping down?	Use bowser to dampen down.
Stockpile and Processing Areas	Do dusty wastes or surfaces need damping down?	Use bowser or mobile suppression unit to dampen down.
Site road between final wheel wash and public highway	Check it is clear of mud and debris, is action required?	Call road sweeper
Public highway	Check it is clear of mud and debris, is action required?	Call road sweeper

4.4 A record of the inspections and their findings, together with the prevailing weather conditions, will be kept in a log book made specifically for this purpose.

Dust Action Plan

4.5 Should there be visible dust emissions across the Site boundary or a dust complaint received, the DAP will be implemented.

4.6 The following bullet points constitute the DAP:

- Identified source(s) of off Site dust emissions will be ceased and/or additional mitigation will be implemented with immediate effect.
- An Accident and Incident Record (see Form C in the Environmental Management System) will be completed. Upon completion, this procedure ensures that:
    - the root cause has been identified; and
    - action has been put in place to prevent recurrence of root cause;
- If a complaint is received it must be investigated fully and the source of the dust identified (see Form D in the EMS);
- The EA is notified if pollution has been caused off site;
- Once the source has been identified, mitigated and recorded operations can be resumed;
- A record of the complaint together with the remediation actions and the completed proforma in (Forms C and D) will be kept on site; and a review of the site specific mitigation measures detailed above will be undertaken.

Out of hours

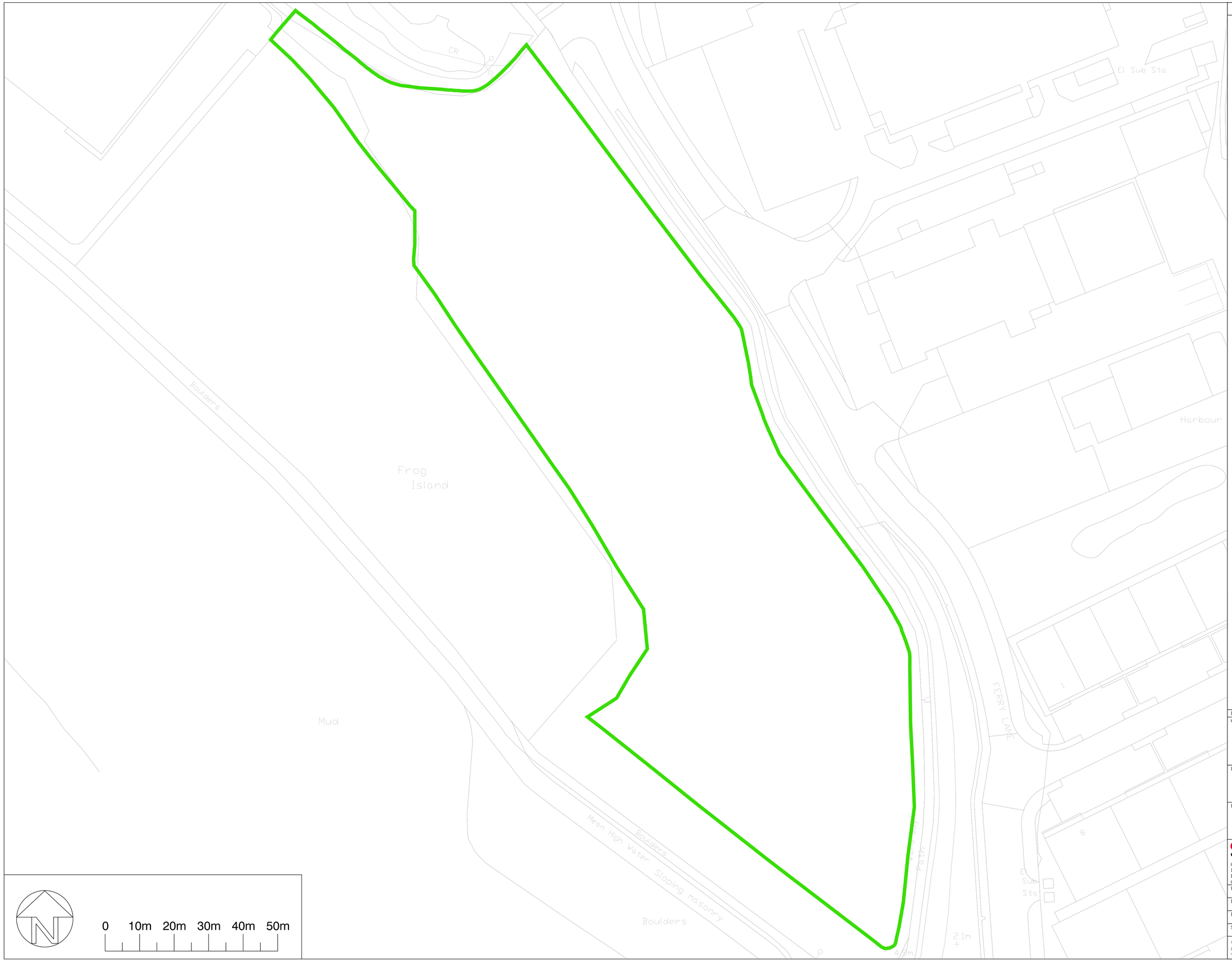
4.7 In the event that there are dust emissions from the Site out of hours, contact details, including out of hours contact numbers are provided on the Site notice board.

DRAWINGS

Environmental Permit Area	Drawing No. 3655-SK-160209	Scale: 1:500@A1
Topographical Survey	Drawing No 024-022-SK05	Scale: 1:1000@A3

DO NOT SCALE FROM THIS DRAWING

PERMITTED AREA



Rev	Revisions	Date
-	Issued for Planning Purposes	19/02/16

Client

Walsh

Project

RAINHAM

Drawing Title

ENVIRONMENTAL PERMIT AREA

CLARKE & ASSOCIATES

Consulting Engineers & Project Managers

Clarke & Associates Limited
12, Bridgewater Street
LYMM
Cheshire WA13 0AB

tel 01925 758811
fax 01925 758828
e-mail engineers@clarkeandassociates.co.uk

Drawn by MAJ	Checked by DAC
Date FEB 2016	Saved in Autocad r2007
Plotted at A1	Drawing No. 3655-SK-160219
Scale 1:500	

Drawing Number:
024-022-Frog Island_SK05

Notes:
Serial number: 113819

DATUM
GRID - ORDNANCE SURVEY NATIONAL GRID (OSTN15)
LEVELS - ORDNANCE SURVEY (OSGM15)

Legend:

Client:
Walsh

L&SS
Land & Satellite Surveys Ltd
(07885) 266029
www.landandsatellitesurveys.co.uk

Site:
Frog Island
Ferry Lane South
Rainham
Essex
RM13 9JY

Title:
Topographic Survey

Scale:	Drawn:	Date:	Job No:
1:1000	MH	16/11/17	024-022

Drawing Number:
024-022-Frog Island_SK05

APPENDIX 1

Specification of Portable Independent Rotary Unit

apps UK Ltd
Unit 3, Paisley Works
14 Windover Road
Huntingdon
PE29 7EB
T: +44 [0]1480 45 88 88
E: alex.wild@appsuk.com
W: www.apps-group.com

APPS UK Ltd Odour & Dust Control Specialists

Mobile PIRA Unit

(Portable Independent Rotary Unit)

PIRA (Portable Independent Rotary Atomiser)

The PIRA is designed to provide excellent coverage in order to achieve odour control and/or dust suppression in both outdoor and indoor environments. Highly mobile, it can be moved to various locations quickly and is the ideal solution to variable, localised and emergency odour or dust problems.

It is highly effective when used in conjunction with Airborne10 Surfactant Induced Absorption Technology proportionally dosed to eliminate a wide range of environmental pollutants.

The PIRA is compact, robust, powerful and designed for frequent use, in the harshest of environments.

Its immediate availability for on-site emergency use ensures that the operator is always prepared for unexpected issues, quickly tackling odour and dust problems, preventing complaints and unwanted investigations, ensuring compliance with air pollution regulations.

Apps UK Ltd P.I.R.A is an adaption of a static Rotary Atomiser and is a totally self-contained mobile unit which will produce a droplet size of 40-70 microns.

The entire unit is built onto a sturdy road legal galvanised trailer to allow easy transit between sites and to assist in final positioning at the workplace.

The trailer is fitted with a jockey wheel, tow hitch, a safety brake wire, two rear support legs, a full trailer type lighting set and a hand brake.

The P.I.R.A can be towed by a car, van or 4 x 4.

Mounted on the trailer is a water tank (1100ltrs) capacity, diesel generator, pump, control panels and a telescopic mast which can extend the rotary atomiser mounted upon it up to 3.5metres.

PIRA Specification

Water Tank Operation Time (1100 Litres capacity)	Min 11Hrs – Max 110Hrs
Water Consumption	10 – 100 Litres Per Hour
Airborne 10 Dose Rate	0.15- 1.25%
Atomiser Speed	10,000RPM
Fan	1370 RPM / 2.354CFM
Diesel Tank Operation Time	5 – 7 Hrs
Mast Height	3.5 Meters
Additional bracket	0 – 45°

Benefits

- Odour or Dust control
- Quick Deployment
- Versatility
- Up to 37Hrs Running time*
- Proportional Dosing
- Low Running Costs
- Unaided

Distribution Centres

- Throughout the UK & Ireland

Applications

- Transfer Stations
- Landfill
- Remediation
- Composting
- Demolition
- Events Cooling Systems

Airborne Range

Airborne10
Airborne5 Airborne3
Airborne2 Airborne1

*Based on water only

Airborne10 **S.I.A.T**

How Does Airborne 10 Work

Airborne10 is the proprietary name for Surfactant Induced Absorption Technology S.I.AT.

Airborne10 is a sophisticated blend of surfactants that when introduced into the flow of water and atomised through an Apps UK Ltd system alters the effective area or interface of the water droplet by something in the order of 500,000%, making the water droplet highly absorbent.

It achieves this by having its hydrophilic (water loving tail) in the water droplet and hydrophobic (water hating tail) end of the molecules out of the droplet and in the air, this is what draws particulates out of the atmosphere and absorb them within the water droplet. As a result of this absorption the droplet increases in weight and eventually falls to the ground where it naturally biodegrades.

Airborne10 is a non-selective technology which means when atomised into the atmosphere in its water/chemical mix it will look to draw into the water droplet any airborne particulate.

Gas will be absorbed into the solute and bio degrades when the droplet eventually drops to the ground. Dust will be removed from the air and brought down to the ground.

Bacteria and virus is put into statis and rendered harmless.

Apps UK Ltd.'s Airborne10 is the only technology in the world that scrubs the air of pollutants in such an effective manner, in the year 2000 it was awarded Millennium Product Status and has approval by the WRC and the EPA.

S.I.A.T. (Airborne 10) is an approved abatement technology under the European Union's Integrated Pollution Prevention and Control (IPPC) regulations.

In the abatements techniques under 4.2.7 Absorption (scrubbing) it states:-

Absorption is a process involving mass transfer between a soluble gas and a liquid solvent in a gas-liquid contacting device (a "scrubber").

There may also be benefit in the addition of surfactants to the liquor to modify the effective surface area and hence aid the adsorptive process. *based on mains electric usage and a flow rate of 30 litres per hour

Airborne10 is a single pass gas scrubber.

Physical – Chemical Properties

Form	Liquid
Colour	Varies dependant on product
Odour	Odourless/Tracer
Change in Physical State	None
Density/Bulk Density	0.9996 – 1.0006@20°C (H20=1
Solubility	Complete in Water
PH Value	6.8
Flash Point	Non Flammable
Ignition Temperature	N/D
Explosion Limits	N/D

APPENDIX 2

Specification for DustMac99 wetting agent and safety data sheet

DustMac

Suppressants for Dust

DustMac99

Sales Contact: Alex Wild

Contact Number: 07852 324218

APPS UK Ltd Valley Works Thurning Road Luddington Peterborough PE8 5QX
Tel: 01832 293600 www.apps-group.com

Specification

Suppressants for Dust

APPS UK's DustMac products are formulated to form a strong bond that seals loose dirt and particles that would normally become airborne when disturbed by wind or contact with tyres on vehicles driving over them. DustMac bonds dust particles on the road thus keeping the particles together and never allowing them to become airborne in the first place. We have products that will work in dry hot conditions and can help you stop Track Out violations.

When left untreated unpaved roads, haul roads, gravel roads, trails, and driveways can produce visible airborne dust. This dust can cause issues with air quality, visibility, breathing, environmental safety and local compliance standards. Dust can also lower the life cycle of machinery. APPS UK's Product Development Team has developed a multitude of dust control solutions including a dust control for roads to answer the needs of our customers.

DustMac 99 wetting agents are designed to increase waters ability to wet dust particles and suppress material emissions, allowing you to control dust more effectively with less mess and less moisture. The relatively high surface tension of water is a basic reason why water alone is insufficient to effectively penetrate crushed coal, rock or other fibrous materials. The water surface is too hard, resulting in water particles bouncing off of dust particles instead of wetting them. Adding wetting agents to water reduces the surface tension thereby improving its ability to wet particles, penetrate rock or coal and reduce dust. The end result is less equipment at fewer application points and reduced installation costs. These surfactants are the best technique for quickly and easily suppressing dust in rapid material movement applications such as conveyors, transfers points, drop points and loading and unloading of hoppers.

Benefits

- Environmental Impact
- Reduce Cost
- Improved Productivity
- Proportional Dosing
- Low Running Costs

Service Centres

- Peterborough
- Wakefield
- Ireland

Applications

- Quarries
- Haul Roads
- Stockpiles
- Crushers
- Conveyors
- Airborne Dust Suppression
- Rail

DustMac Range

DustMac71
DustMac44

DustMac99
DustMac61

Other Information

DustMac 71 and **DustMac44** encrusting agents are designed to produce a semi-permanent shell over your material. This coating protects against rain and wind erosion, reducing your maintenance costs and improving your safety. These products also prevent air from entering, which minimises oxidation in sealed piles, and reduces the risk of spontaneous combustion.

DustMac61

DustMac61foaming agent is specially designed to cover and then encapsulate to proven air born dust reducing dust levels occurring above and below ground in a multitude of applications.

Application Services

The Apps UK Ltd is suitably designed to provide a reliable cost effective application method for our Dustmac 71, 44, 61, 99 Products.

It can be utilised in numerous industries which have issues from traffic movement, stockpiles and conveyor dust issues.

The D.M.C.U is primarily a flexible way of distributing evenly DustMac71 onto the ground which encrusts the surface preventing dust from rising into the atmosphere.

The DustMac nozzle system is fully integrated in to your manufacturing process to elevate dust emissions from crushing, conveyor movement or stockpiling.

Utilising our primary knowledge and expertise Apps UK Ltd can retro fit any vehicle, water bowser or manufacturing plant to ensure a consistent and cost effective application of our products.

SAFETY DATA SHEET

According to Regulations (EC) No. 2015/830 AND 1907/2006

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name: **DustMac 99**

Type of Product: Mixture

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Processing aid for industrial application.

Uses advised against: All non-professional uses.

1.3. Details of the supplier of the safety data sheet

Company: APPS UK Ltd
Valley Works, Thurning Road
Luddington, Peterborough
PE8 5QX

Email address: sales@appsukltd.com

1.4. Emergency telephone number:

National Poison Information Service: NHS Direct: 0845 4647 or 111 (24/24,7/7): Scotland: NHS 24-08454 24 24 24 (24/24, 7/7)

Section 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) 1272/2008

Acute Tox. 4;H302, Eye Dam. 1;H318

2.2. Label elements

Labelling according to Regulation (EC) 1272/2008:

Hazard pictogram(s):

Contains:	Poly(oxy-1,2-ethanediyl), a-tricdecyl-w-hydroxy-,branched
Signal word:	Danger
Hazard statement(s):	H302 – Harmful if swallowed H318 – Causes serious eye damage
Precautionary statement(s):	P270 – Do not eat, drink or smoke when using this product P280 – Wear eye protection / face protection P301 + P312 – IF SWOLLOWED: Call a POISON CENTRE or doctor / physician if you feel unwell P330 – Rinse mouth P305 + P351 + P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P310 – Immediately call a POISON CENTER or doctor / physician
Additional elements:	None

2.3. Other hazards

None

PBT and *vPvB* assessment:
Does not fulfil the criteria according to Annex XIII of REACH.

For explanation of abbreviations see Section 16.

SECTION 3: Composition/Information on ingredients

3.1. Substances
Not applicable, this product is not a substance.

3.2. Mixtures

Hazardous components

Isotidecanol, ethoxylated

Concentration/ gamme:	85 - 95%
EC-No:	Polymer
REACH Registration Number:	Not applicable (polymer).

Classification according to Directive 67/548/EEC: Xn;R22, Xi;R41

Classification according to Regulation (EC) No.: 1272/2008: Accute Tox. 4;H302, Eye Dam. 1;H318

For explanation of abbreviations see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:
If inhaled, immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Skin contact:
Wash off immediately with plenty of water. Consult a physician if necessary.

Eye contact:
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

Indigestion:
Consult a physician. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person.

4.2. Most important symptom and effects, both acute and delayed

Risk of serious damage to eyes.

4.3. Indication of any immediate medical attention and special treatment needed.

No information available.

Other information:
In case of accident or if you feel unwell, seek medical advice immediately (show label where possible). Take off all contaminated clothing immediately.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:
Water spray. Dry powder. Foam. Carbon dioxide (CO2).

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products:
Thermal decomposition can lead to release of irritating gases and vapours.

5.3. Advise for firefighters

Protective measures:
Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions:
Use personal protective equipment.

Protective equipment:
Wear suitable protective clothing, gloves and eye/face protection.

Emergency procedures:
Keep people away from spill/leak.

6.2. Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

6.3. Methods and material for containment and cleaning up

Soak up with inert absorbent material.

Small spills:
Small amounts: Soak up with inert absorbent material and collect in a waste container for disposal.

Large spills:
Soak up with inert absorbent material. Shovel into suitable container for disposal. Do not flush with water.

6.4. Reference to other sections

SECTION 7: Handling and storage; SECTION 8: Exposure controls/personal protection; SECTION 13; Disposal considerations;

Section 7. Handling and storage

7.1. Precautions for safe handling

Avoid contact with skin and eyes. Use personal protective equipment.

7.2. Conditions for safe storage, including any incompatibilities.

Keep containers tightly closed in a dry, cool and well ventilated place.

7.3. Specific end use(s)

This information is not available.

SECTION 8; Exposure controls/personal protection

8.1. Control parameters

National occupational expose limits:
None

Derived No and Minimum Effect Levels (DNELs/DMELs)
None known.

Predicted no-effect concentrations (PNECs)
None known.

8.2. Exposure controls

Appropriate engineering controls:

Ensure adequate ventilation, especially in confined areas.

Individual protection measures, such as personal protective equipment:

a) Eye/face protection:
Safety glasses with side-shields. Tightly fitting safety goggles.

b) Skin protection:
Protective suit.

c) Hand protection:
Impervious gloves. Be aware that liquid may permeate gloves, frequent change is advised. Suitable gloves can be recommended by the glove supplier

d) Respiratory protection:
No personal respiratory protective equipment normally required. In case of insufficient ventilation wear suitable respiratory equipment.

Environmental exposure controls:

Do not flush with water.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

a)	Appearance:	Clear to slightly yellow liquid
b)	Odour:	Slight
c)	Odour threshold:	No data available
d)	Ph:	5 – 7 @ 20 g/L
e)	Melting point/freezing point:	< -10°C
f)	Initial boiling point and boiling rate:	Not applicable
g)	Flash point:	<100°C (DIN 51758)
h)	Evaporation rate:	No data available
i)	Flammability (solid, gas)	Not applicable
j)	Upper/lower flammability or explosive rates:	No data available
k)	Vapour pressure:	No date available
l)	Vapour density:	No data available
m)	Relative density:	0.9 – 1.1 @ 20°C
n)	Solubility(ies)	Completely miscible in water
o)	Partition coefficient:	Not applicable
p)	Autoignition temperature	No data available
q)	Decomposition temperature:	No data available
r)	Viscosity:	130 mPas @ 20°C
s)	Explosive properties:	Not expected to be explosive based on chemical Structure
t)	Oxidizing properties:	Not expected to be oxidizing based on the chemical structure

9.2. Other information

None.

SECTION 10. Stability and reactivity

10.1. Reactivity

Stable at normal conditions

10.2. Chemical stability

Stable at normal ambient temperature and pressure

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

Keep away from heat and sources of ignition. Protect from light. Protect from contamination.

10.5. Incompatible materials

Strong oxidizing agents. Strong acids.

10.6. Hazardous decomposition products

No decomposition if stored and applied as directed.

SECTION 11. Toxicological information

11.1. Information on toxicological effects

Information on the product as supplier:

Acute oral toxicity:	LD50/oral/rat = 200 – 300 mg/kg
Acute dermal toxicity:	LD50/dermal/rat > 2000 mg/kg
Acute inhalation toxicity:	The product is not expected to be toxic by inhalation.
Skin corrosion/irrigation:	Not irritating.
Serious eye damage/eye irritation:	Risk of serious damage to eyes.
Respiratory/skin sensitisation:	Not sensitizing.
Mutagenicity:	Not mutagenic.
Carcinogenicity:	Not carcinogenic
Reproductive toxicity:	Two-Generation Reproduction Toxicity (OECD 416) NOAEL/rat > 250 mg/kg/day Prenatal Development Toxicity Study (OECD 414) NOAEL/Maternal toxicity/rat > 50 mg/kg/day NOAEL/Developmental toxicity/rat > 50 mg/kg/day
STOT – single exposure	No known effects.
STOT – repeated exposure	NOAEL/oral/rat/600 days = 50 mg/kg/day
Aspiration hazard:	No hazards resulting from the material as supplied.

Relevant information on the hazardous components:

Isotridecanol, ethoxylated

Acute oral toxicity:	LD50.oral/rat = 200 – 300 mg/kg
Acute dermal toxicity:	LD50/dermal/rat > 2000mg/kg
Acute inhalation toxicity:	No data available.
Skin corrosion/irrigation:	Not irritating.
Serious eye damage/eye irritation:	Causes serious eye irritation.
Respiratory/skin sensitisation:	The results of testing on guinea pigs showed this material to be non-sensitizing
Mutagenicity:	Not mutagenic.
Carcinogenicity:	Not carcinogenic
Reproductive toxicity:	Two-Generation Reproduction Toxicity (OECD 416) NOAEL/rat > 250 mg/kg/day Prenatal Development Toxicity Study (OECD 414) NOAEL/Maternal toxicity/rat > 50 mg/kg/day NOAEL/Developmental toxicity/rat > 50 mg/kg/day
STOT – single exposure	No known effects.
STOT – repeated exposure	NOAEL/oral/rat/600 days = 50 mg/kg/day
Aspiration hazard:	No known effects.

SECTION 12. Ecological information

12.1. Toxicity

Information on the product supplied:

Acute toxicity to fish:	LC50/Cyprinus carpio/96 hours = 1 – 10 mg/L (OECD 203)
Acute toxicity on invertebrates:	EC50/Daphnia/48 hours = 1 – 10 mg/L (OCED 202)
Acute toxicity to algae:	IC50/Desmodesmus subspicatus/72 hours = 1 – 10 mg/L (OECD 201)
Chronic toxicity to fish:	No data available
Chronic toxicity to invertebrates:	No data available
Toxicity to microorganisms:	EC10/activated sludge/17 h > 10000 mg/L (DIN 38412-8)
Effects on terrestrial organisms:	No data available. Readily biodegradable, exposure to soil unlikely
Sediment toxicity:	No data available. Readily biodegradable, exposure to sediment unlikely.

Relevant information on the hazardous components

Isotridecanol, ethoxylated

Information on the product supplied:

Acute toxicity to fish:	LC50/Cyprinus carpio/96 hours = 1 – 10 mg/L (OECD 203)

Acute toxicity on invertebrates:	EC50/Daphnia/48 hours = 1 – 10 mg/L (OCED 202)
Acute toxicity to algae:	IC50/Desmodesmus subspicatus/72 hours = 1 – 10 mg/L (OECD 201)
Chronic toxicity to fish:	No data available
Chronic toxicity to invertebrates:	No data available
Toxicity to microorganisms:	EC10/activated sludge/17 h > 10000 mg/L (DIN 38412-8)
Effects on terrestrial organisms:	No data available.
Sediment toxicity:	No data available.

12.2. Persistence and degradability

Information on the product as supplier:

Degradation:	Readily biodegradable. > 60 % / 28 days (OECD 301 B)
Hydrolysis:	Does not hydrolyse.
Photolysis:	No data available

Relevant information on the hazardous components:

Isotridecanol, ethoxylated

Degradation:	Readily biodegradable. > 60 % / 28 days (OECD 301 B)
Hydrolysis:	Does not hydrolyse.
Photolysis:	No data available.

12.3. Bio accumulative potential

Information on the product as supplied:

Partition co-efficient (Log Pow):	>3
Bioconcentratetion factor (BCF):	No data available

Relevant information on the hazardous components:

Isotridecanol, ethoxylated

Partition co-efficient (Log Pow):	>3

12.4. Mobility in soil

Information on the product as supplied:

Koc:> 5000

Relevant information on the hazardous components:

Isotridecanol, ethoxylated

Koc:> 5000

12.5. Results of PBT and vPvB assessment

PBT assessment:
Does not fulfil the criteria according to Annex XIII of REACH.

VPvB ASSESSMENT:
Does not fulfil the criteria according to Annex XIII of REACH.

12.6. Other adverse effects.

None known.

SECTION13. Disposal considerations

13.1. Waste treatment methods

Waste from residues / unused products:

Dispose in accordance with local and national regulations.

Contaminated packaging:

Reuse or recycle container after thorough cleaning.

Recycling:

Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations.

SECTION 14. Transport information

Land transport (ADR/RID)
Not classified.

Sea transport (IMDG)
Not classified

Air transport (IATA)
Not classified

SECTION 15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

All components of this product have been registered or pre-registered with the European Chemicals Agency or are exempt from legislation.

15.2. Chemical safety assessment

A Chemical Safety Assessment for this product has been carried out by the person responsible for producing this Safety Data Sheet. All relevant information used to conduct this assessment are included in the safety Data Sheet as well as any resulting Risk Reduction Measures.

SECTION 16. Other information

This data sheet contains changes from the previous version in sections(s):

SECTION 1. Identification of the substance/mixture and of the company undertaking, SECTION 2. Hazards Identification, SECTION 3. Composition/information on ingredients, SECTION 4. First aid measures, SECTION5. Firefighting measures, SECTION 6. Accidental release measures, SECTION 7. Handling and storage, SECTION 8. Exposure controls/personal protection, SECTION 9. Physical and chemical properties, SECTION 10. Stability and reactivity, SECTION 11. Toxicology information, SECTION 12. Ecological information. SECTION 13. Disposal considerations, SECTION 14. Transport information. Section 15. Regulatory information, SECTION 16.

Other Information.

Key or legend to abbreviations and acronyms used in the safety data sheet:

Abbreviations
Xi – Irritant
Xn – Harmful
Acute Tox. 4 = Acute toxicity Category 4
Eye Dam 1 = Serious eye damage/eye irritation Category Code 1

R-Phrases
R22 – Harmful if swallowed
R41 – Risk of serious damage to eyes

H-Phrases
H302 – Harmful if swallowed
H318 – Causes serious eye damage

This SDS was prepared in accordance with the following:

Regulation (EC) No. 1907/2006
Regulation (EC) No. 1272/2008
Regulation (EC) No. 205/830

Version: 15.01.a

RE001

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material used in combination with any other materials or in any process, unless specified in the text.