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Air quality impact assessment: installation of emergency generator

The Lantern, London

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1 EXECUTIVE SUMMARY

The following conclusions concerning the minor works to 75 Hampstead Road have been reached;

- The risk of dust pollution to human health during the demolition = **low**.
- The risk of dust pollution to human health during the earthworks = **low**.
- The risk of dust pollution to human health during the construction = **low**.
- The risk of dust pollution to human health during the track-out phase = **low**.
- The risk of dust pollution to ecology during the demolition phase = **low**.
- The risk of dust pollution to ecology during the earthworks phase = **low**.
- The risk of dust pollution to ecology during the construction phase = **low**.
- The risk of dust pollution to ecology during the track-out phase = **low**
- The human receptor sensitivity of the area is deemed to be **high**.
- The ecological receptor sensitivity of the area is deemed to be **low**.
- Air quality monitoring is recommended. The approach that should be taken is set out in section 8.4.
- The overall risk level associated with the installation of the emergency generator is determined to be **low** (Table 6.3). Specific best practice mitigation steps have been identified (Table 8.1).
- Overall it is judged that the new development (installation of the emergency generator) will have an **insignificant** effect on current air quality measured in the area via existing air quality network sensors/diffusion tubes.

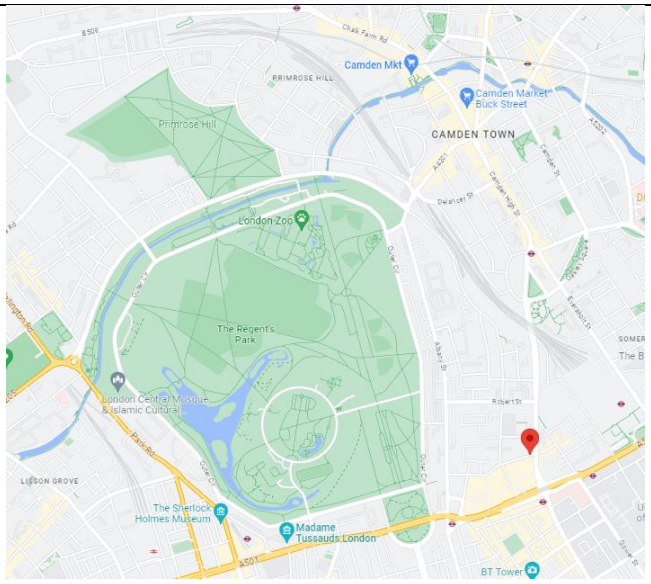
CONTENTS

2 INTRODUCTION

An air quality impact assessment has been specified in relation to the proposed installation of an emergency generator to an existing office building in Camden, North London.

The Lantern office building is situated at 75 Hampstead Road, London, NW1 2PL. Figure 2.1 shows the development in place and the wider area that it sits within.

(a)



(b)

(a) The Lantern Building at 75 Hampstead Road, London, NW1 2PL
(b) The wider surroundings (the red dot denotes the location of the building)

The building has already been constructed and this will have included an assessment of any construction/demolition actions at the site on air quality impacts in the area. This additional evaluation looks at the air quality impact that might be attributed to the addition of a generator in the basement of the building, designed to provide emergency back up power.

3 POLICY CONTEXT

The Lantern office building is situated in the Local Authority area of Camden Council. This council has set out its attitude and policies towards maintaining air quality in a number of ways some of which are summarised in Table 3.1

Table 3.1: Camden Council guidance on air quality (significant references)	
1	 **Camden Clean Air Action Plan**. The document outlines the councils approach for improving air quality and protecting public health. This looks at what should happen up to 2025.
2	https://www.camden.gov.uk/air-quality Active Camden council web site that informs residents and businesses about; • air quality in the Local Authority • sources of pollution • measuring and improving air quality • reducing construction emissions • reducing building emissions • reducing transport emissions
3	 **Camden Planning Guidance: Air Quality.** Reaffirms that all of Camden is a designated Air Quality Management Area due to the already high levels of NO2 and PM10 (2021). The document sets out the key triggers that impact on air quality of sensitised people and the type/scale of developments that are likely to exacerbate this.

The development is in an Air Quality Management Area (AQMA) meaning that it does not meet the national air quality objectives as determined by the local authority. Pollutants that are deemed high are Particulate Matter (PM_{10}) and nitrogen dioxide (NO_2). Responsibility for air quality in the borough is jointly shared by Canden Council and the Mayor of London.

4 BACKGROUND POLLUTION ASSESSMENT

The Lantern building site is in an Air Quality Management Area (AQMA) meaning that it does not meet the national air quality objectives as determined by the local authority (Camden Council) for Particulate Matter (PM_{10}) and nitrogen dioxide (NO_2).

Ref: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=331

4.1 Air quality monitoring in Camden

The following locations are where air quality is being monitored in Camden, either by the Local Authority itself, or The UK Environment Agency;

- Bloomsbury (Russell Square Gardens)
- Camden High Street
- Coopers Lane
- Euston Road (probably the closest air quality monitoring station to The Lantern).
- Holborn
- Swiss Cottage (Finchley Road).

The graphs below show the concentrations of the main pollutants of concern measured over the last full month from the Euston road air quality monitoring station.

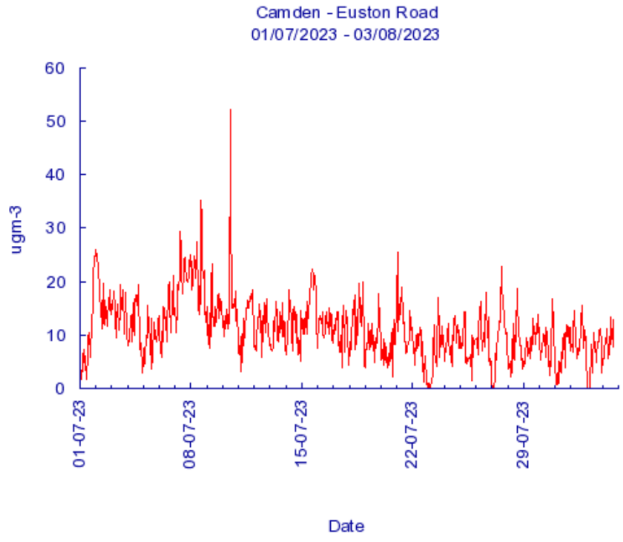


Figure 4.1: Concentration of PM_{10} (ugm^3) over 30 days profile, Euston Rd air quality monitoring

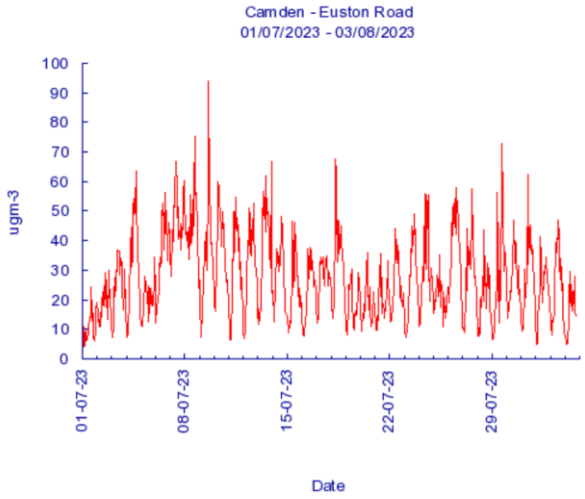


Figure 4.2: Concentration of NO_2 (ugm^3) over 30 days profile, Euston Rd air quality monitoring

Any development must not unduly increase the background pollution levels associated with the area. In the context of the 'development' at The Lantern, this means the operation of the emergency generator should not result in average hourly annual increases to the background concentration of NO2 or PM10. The air quality around the Lantern building will be measured to verify this, once the generators are operational.

The targets for air quality in Camden are presented in Table 4.1

Pollutant	Objective (limit value and number of exceedances)	Averaging period
Nitrogen dioxide (NO_2)	40 $\mu g/m^3$	Calendar year (annual mean)
	200 $\mu g/m^3$ (not to be exceeded more than 18 times a year)	1-hour mean
Particulate matter PM_{10}	40 $\mu g/m^3$	Calendar year (annual mean)
	50 $\mu g/m^3$ (not to be exceeded more than 50 times a year)	24-hour mean
Particulate matter $PM_{2.5}$	25 $\mu g/m^3$	Calendar year (annual mean)

Table 4.1: target levels for N02 and particulates in Camden Local Authority, 2023

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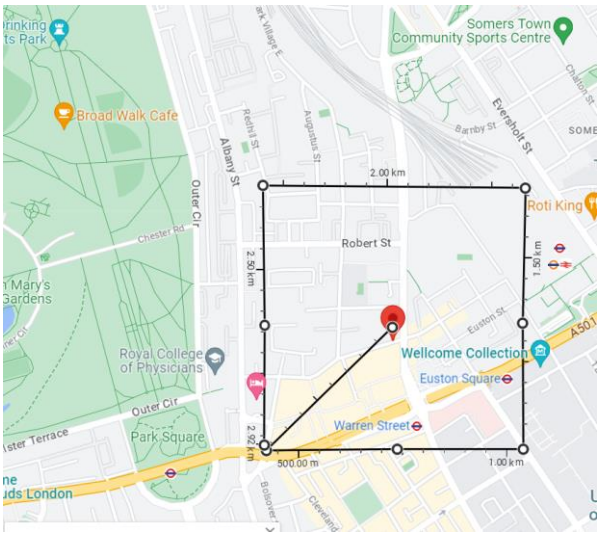
5 RECEPTORS EXPOSED TO AIR QUALITY

In determining the sensitivity of the location to the development and operation of The Lantern Building the first objective is to identify the human and ecological receptors that are most likely to be affected by poor air quality. This is a function of proximity to the development and the number and type of human/ecological receptors that are present.

Figure 5.1 shows the area around The Lantern building covering 300m, in all directions. From this any human and ecological receptors can be assessed in terms of their proximity to a potential source of pollution.



(a)

(b)

Figure 5.1: (a) Area around The Lantern building, (b) radiating out approximately 300m in all directions

5.1 Human Receptors

An assessment has been made of the human receptors that are present around the area of The Lantern building. These are the following groups;

- Staff at The Lantern building.
- Staff at The Schafer hotel.
- Staff at The Diorama Arts House.
- Staff st the Mestizo Mexican restaurant.
- Staff at the Zodiac bar club.
- Staff at the Wesley Euston hotel

- Staff and patients at the University College Hospital

Table 5.1 identifies the approximate distance of each human receptor type and the numbers involved. Based on the standard assessment procedure set out in detail in 'The Control Of Dust And Emissions During Construction And Demolition Supplementary Planning Guidance, 2014' the sensitivity of each group is determined, from which the overall sensitivity of the area can be concluded, Table 5.2.

Table 5.1: Closest human receptors to the Lantern building new generator

Sensitive human receptors	Approx. distance from potential dust source	Estimated no. of receptors	Sensitivity of area
Staff in The Lantern	<20m	10-100	High
Residents in apartments in the area	<100m	>100	High
Staff at Schafer hotel	<100m	10-100	High
Staff at Diorama Arts	<150m	10-100	Medium
Staff at Mestizo	<150m	<10	Medium
Staff at Zodiac	<200m	<10	Low
Staff at Wesley hotel	<300m	10-100	Low
Staff and patients at University College Hospital	<300m	>100	Low

Table 5.2: Sensitivity of people to dust

Receptor types	Sensitivity	Present
Hospitals staff & patients	High	Yes
School staff and pupils	High	No
Residential residents	High	Yes
Care home staff and residents	High	No
Office workers	Medium	Yes
Shops workers	Medium	Yes
Public footpath users	Low	Yes
Park users	Low	No
Shopping street users	Low	Yes

Based on the information in Tables 6.1 and 6.2 the human receptor sensitivity for this area is **High**.

5.2 Ecological Receptors

Figure 5.2 shows the ecological receptors within 350m of the proposed development.

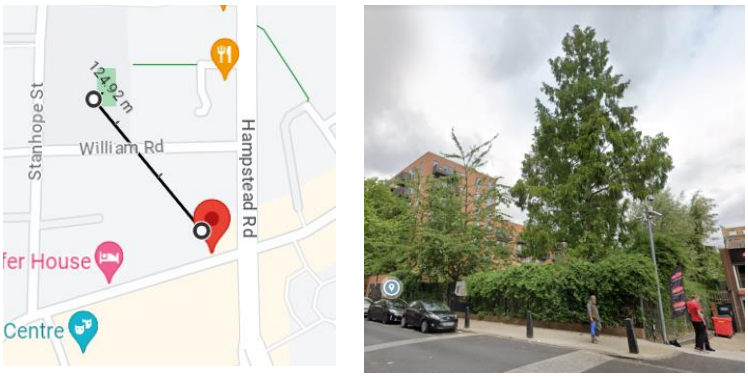


Figure 5.2: Ecological receptors within 350m of The Lantern building

The only ecological site of significance within 350m is a small green park near William Road. There are other small green spaces associated with urban housing.

Table 5.3 identifies the approximate distance of the ecological sites from The Lantern building.

Table 5.3: Ecological receptors within 350m of the proposed development	
Ecological receptors	Approx. distance
Small green park off William Street	125m

Given the distance of this green space the ecological receptor sensitivity is deemed **low.**

Table 5.4 identifies the ecological importance of the sites from which the ecological receptor sensitivity can be determined.

Table 5.4: Sensitivity of ecology to dust		
Receptor types	Sensitivity level	Present
International/national designated site	High	Not known to be
Species recognised in Red data list for GB	High	Not known to be
Area designated Special Area of Conservation (SAC)	High	Not known to be
Locally important plant species present	Medium	Not known to be
Nationally designated ecological area	Medium	Not known to be
Site of Special Scientific Interest (SSI)	Medium	Not known to be
Local nature reserve	Low	Not known to be
Based on tables 5.3 and 5.4 the ecological receptor sensitivity for this area is **Low**.		

6 AIR QUALITY DUST RISK ASSESSMENT

Guidance has been provided on Dust Emission Magnitude (DEM) arising from demolition, earthworks, construction and track-out at a development. The full guidance is set out in the publication, 'The Control Of Dust And Emissions During Construction And Demolition Supplementary Planning Guidance, July 2014'. the development that is relevant to this study is simply the installation of the backup generator within the ***existing*** building.

A standard survey (Table 6.1) is used to measure the impact of any development on local air quality and the same approach is taken for this project although the only development proposed is the operational use of an emergency generator within an ***existing*** building.

Table 6.1: Demolition, earthworks and construction phase questionnaire

Set questions		*Appropriate evaluation*
1.	How large is the site that is to be demolished (if there are buildings that are to be demolished)? (a) >50,000m^3 (b) 20,000-50,000m^3 (c) >20,000m^3	*No demolition to occur*
2.	If site demolition is to occur which type of material will be demolished? (a) Dusty material like concrete (b) Low dust material like cladding/timber	*No demolition to occur*
3.	If site demolition is taking place at what height will this occur? (a) >20m (b) Between 10-20m (c) <10m	*No demolition to occur*
4.	Will any of the following earthworks be performed at the site? - Excavation - Haulage - Tipping - Stockpiling	*No*
5.	What will be the total site volume for earthworks? (a) >10,000m^3 (b) Between 2,500-10,000m^3 (c) >2,500m^3	*(c)*
6.	What is the approximate number of heavy earth moving vehicles to be present at the site at any one time? (a) >10 (b) Between 5-10 (c) <5	*No heavy earth moving vehicles involved*

Table 6.1: Demolition, earthworks and construction phase questionnaire		
Set questions		*Appropriate evaluation*
7.	What is the total volume of earth to be removed from the site? (a) >100,000 tonnes (b) Between 20,000-100,000 (c) <20,000 tonnes	*(c)*
8.	What is the total volume of construction anticipated? (a) >100,000m^3 (b) Between 25,000-100,000m^3 (c) <25,000m^3	*No construction involved*
9.	When will demolition of any buildings at site commence/end?	*No demolition to occur*
10.	When will construction at the site start/end?	*No demolition to occur*
11.	How many heavy goods vehicles (>3.5 t) are required daily to service the site?	*None*
12.	How many days will vehicle journeys be required at the site?	*None*
13.	Are vehicle journeys to take place mainly during summer or winter months?	*None*
14.	What is the soil type where construction/demolition is to take place?	*Not applicable*
15.	Will water be used to reduce the generation of particulates during construction/demolition?	*Not applicable*
16.	Will you be monitoring weather conditions daily at the site (wind speed, direction, rainfall) and amending activities if weather effects potentially exacerbate dust loading?	*Yes (local weather data)*
17.	Have you assessed the topography of the site to establish if a canyon effect is likely?	*Urban city landscape*

Additional questions covering risk management, are presented in Table 7.2.

Based on the feedback in table 6.1 the DEM for each phase of the development has been assessed (Table 6.2).

Table 6.2: Dust emission magnitude (DEM)		
Phase	*Impact is;*	*Based on responses to the questions;*
Demolition phase	**Small**	1, 2, 3
Earthworks phase	**Small**	4, 5, 6, 7,
Construction phase	**Small**	8, 9, 10, 11, 12, 13, 14, 15, 16,
Track-out phase	**Small**	2, 6, 9, 10, 11, 17,

Table 6.3 sets out the overall human health risk associated with each phase of the development. Table 6.4 presents the overall ecological risks. The assessment is based upon the following;

1. Human receptor sensitivity of the area is **high** (Table 5.2).
2. Ecological receptor sensitivity of the area is **low** (table 5.4).
3. Assessment of the DEM for each phase of the development (Table 6.2).

The procedure for making these judgements is explained in the publication, 'The Control Of Dust And Emissions During Construction And Demolition SPG Guidance, July 2014'.

Table 6.3: Defining the risk of dust impacts to human health			
Sensitivity of area	Dust emission magnitude per phase		
	Large	**Medium**	**Small**
High	**Demolition phase**		
			Low risk
	Earthworks phase		
			Low risk
	Construction phase		
			Low risk
	Track-out phase		
			Low risk

Overall the development (installation of an emergency generator) is deemed to be of **low risk** to human health**.**

Table 6.4: Defining the risk of dust impacts to ecology	
Demolition phase	Low risk
Earthworks phase	Low risk
Construction phase	Low risk
Track-out phase	Low risk

Overall the development (installation of an emergency generator) is deemed to be of **low risk** to local ecology, based on an assessment following the procedures set out in 'The Control Of Dust And Emissions During Construction And Demolition SPG Guidance, July 2014'.

7 MITIGATION OF AIR QUALITY IMPACTS & RISK MANAGEMENT

7.1 Risk management actions to consider

Table 7.1 identifies the risk level associated with the development and the specific best practice measures that should be considered, 'The control of dust and emissions from construction and demolition, Best Practice Guidance'.

Table 7.1: Relevant risk level for the development and best practice risk management actions		
Risk level	Relevant	Mitigation best practice guidance
Low risk	Yes	There are insignificant risks associated with the installation of the emergency generator, to local human and ecological receptors. The main objective will be to ensure that the operational use of the generator is kept to a minimum and that any emissions from it are well exhausted from the specific operational site, The Lantern and any surrounding buildings. This can be achieved by exhausting at high level when air movement is good and using the relationship between leeward and windward facing facades to best position any exhaust stacks. Air quality monitoring within The Lantern building and around the immediate site, will also establish if any significant air pollution is being added to the area, over and above other sources in place.
Medium risk	No	n/a
High risk	No	n/a

7.2 Risk management actions to be implemented

Tables 7.2 presents additional questions issued to the development team which are related to determining how risks associated with pollution are to be managed. The questions have been designed in relation to relevant issues raised in the publication, 'The Control Of Dust And Emissions During Construction And Demolition Supplementary Planning Guidance, July 2014.

Table 7.2: Building operation phase & risk management		
Set questions (continued)		*Actions anticipated*
18.	Will you be monitoring air quality around the site during the course of the development	*No*
19.	Will you be modelling air quality around the site?	No
20.	Have you contacted the Local Authority to find out about the air quality status of the site you are to develop?	*Yes*
21.	What primary and secondary energy systems are to serve the site?	Primary is electrical. Gas for landlord hot water generation (2nr calorifiers),

Table 7.2: Building operation phase & risk management		
		1nr existing diesel generator for landlord life safety. 1nr new tenant diesel generator.
22.	Will biomass burning provision be provided?	*No*
23.	Will CHP provision be provided and what fuel type is expected to be used?	*No*
24.	Have low emission boilers been specified for the site?	*Low emission generator*
25.	What size plant is anticipated for the site?	All as existing with the addition of one new 150kVA diesel generator in basement for emergency support of tenant space.
26.	What steps, if any, have been taken to alert the local community about works to take place at the site?	*No significant works are anticipated*
27.	Will the public have a contact number for complaints?	*Yes*
28.	Will records be kept of any complaints concerning dust generated?	*Yes*
29.	Which of the following dust management measures are to be adopted at the site? - Machinery location based on sensitive locations around site - Creation of physical barrier/distance between site and sensitive locations - Installation of solid screens around dust generating activities - Covering of stockpiles that may produce dust under windy conditions - Removal of loose material as soon as possible	*Not applicable to the development type*

Risk management steps to be implemented (Table 7.2) should be reviewed in the context of the best practice guidance measures (Table 7.1).

7.3 Monitoring air quality

Site monitoring for air quality impact is to take place once the generator is operational. The following approach is to be taken;

1. Air quality is to be measured for particulates (large and fine size fractions) and nitrogen dioxide.
2. Air quality will be measured within the building at plant room level when the emergency generator is both operating and on standby mode.
3. Air quality will be measured close to where the exhaust stack is placed. This could be at roof

level or at ground.

4. Air quality will be measured within the building to determine if exhaust emissions have any impact on indoor air quality.
5. Outdoor air quality will be measured at ground and roof levels, both when the generator is in use and in standby mode. Local area air quality data will be examined at the same time.

8 MODELLING POLLUTANTS EMITTED FROM THE GENERATOR

The UK Environment Agency performed a study looking at emissions of NOx from diesel generators. Key observations from the study are identified in Table 8.1.

Table 8.1 Air Quality Modelling & Assessment Unit, Environment Agency (2016) https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf	
Stack design	Diesel generators without stack design measures, such as multiflue tall stack designs, operating pattern restrictions or abatement to achieve stringent ELVs are likely to cause breaches of the short term standard if there are sensitive receptors nearby. With design and control measures implemented the likelihood of exceedances can be significantly reduced. However, potential exceedances could still occur for some plant even with control measures if there are sensitive receptors nearby.

Stack installation	Stack engineering design to ensure good emissions dispersion through release height, buoyancy and momentum can substantially reduce these worst case impacts.
	
	• Where individual engine stacks are implemented they should use good engineering design practices so that the downwash effects from engine containers and other structures are minimised and downwind dispersion is improved.
	• Where individual engine stacks are implemented fewer larger engines are likely to have slightly less of an impact than a greater number of smaller engines.
	• Combining multiple engine flows into multiflue tall stacks or implementing very large engines with tall stacks, greater than 20 m is the most effective design method for reducing the impacts and lowering the risk of short term exceedances.
	  ○ Operational hours restricted to 50 hours per year still has the potential to exceed the standard within 160 m under the worst modelled case, just less than 50 MWth with 2.5 m individual engine stacks.
	  ○ At the MCPD ELV there is still potential for an exceedance within 110 m under the worst modelled case, just less than 50 MWth with 2.5 m individual engine stacks.
	  ○ An unabated diesel generator array with individual engine stacks (2.5 m) and a total rated thermal input of 5 MWth still has potential to exceed the standard within 120 m.

Operational use of diesel generators	Site specific assessment is conducted unless large multiflue stack configurations are proposed, or any of the following: • Operational hours are restricted to 50 hours per year and there are no sensitive receptors within 150 m.

Table 8.1 Air Quality Modelling & Assessment Unit, Environment Agency (2016) https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf	
	• Emissions are at the MCPD ELV and there are no sensitive receptors within 150 m. • The total rated thermal input is less than 5 MWth and there are no sensitive receptors within 150 m.

Table 8.2 Specification details for the generator	
Fuel consumption data	• Fuel type – diesel • Fuel tank capacity – 250 L • Fuel consumption at 100% load – 30 l/h • Fuel consumption at 75% load – 22.7 l/h • Fuel consumption at 50% load – 15.9 l/h
Emissions data	• NO2 emissions – data will be verified during site based air quality monitoring • PM10 emissions - data will be verified during site based air quality monitoring

9 CONCLUSIONS

The following conclusions concerning the minor works to 75 Hampstead Road have been reached;

- The risk of dust pollution to human health during the demolition = **low**.
- The risk of dust pollution to human health during the earthworks = **low**.
- The risk of dust pollution to human health during the construction = **low**.
- The risk of dust pollution to human health during the track-out phase = **low**.
- The risk of dust pollution to ecology during the demolition phase = **low**.
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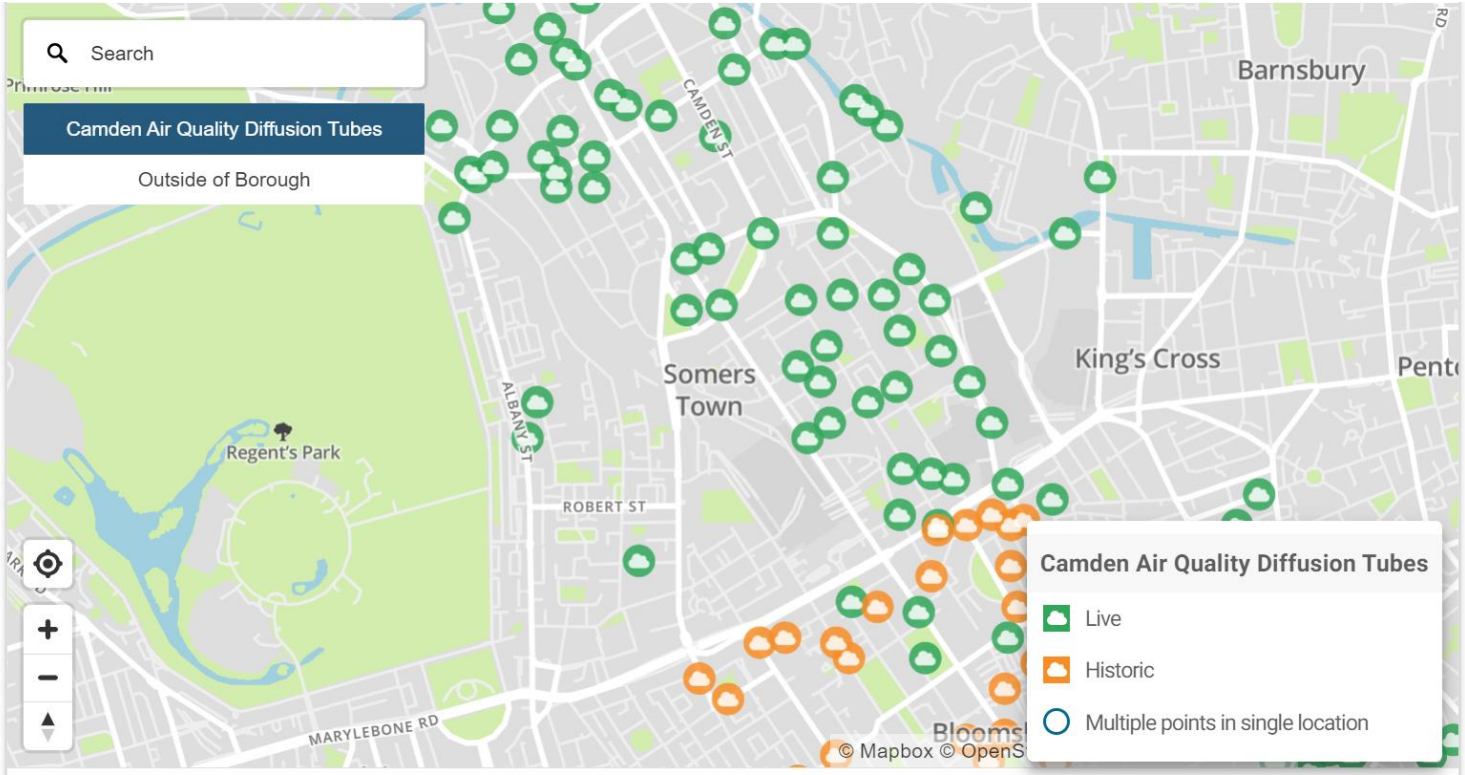
- The human receptor sensitivity of the area is deemed to be **high**.
- The ecological receptor sensitivity of the area is deemed to be **low**.
- Air quality monitoring is recommended. The approach that should be taken is set out in section 8.4.
- The overall risk level associated with the installation of the emergency generator is determined to be **low** (Table 6.3). Specific best practice mitigation steps have been identified (Table 8.1).
- Overall it is judged that the new development (installation of the emergency generator) will have an **insignificant** effect on current air quality measured in the area via existing air quality network sensors/diffusion tubes.

10 APPENDIX: 1 – AIR QUALITY DIFFUSION TUBES IN CAMDEN



Source: https://opendata.camden.gov.uk/stories/s/Camden-Air-Quality-Monitoring/bmrm-k7pv/

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