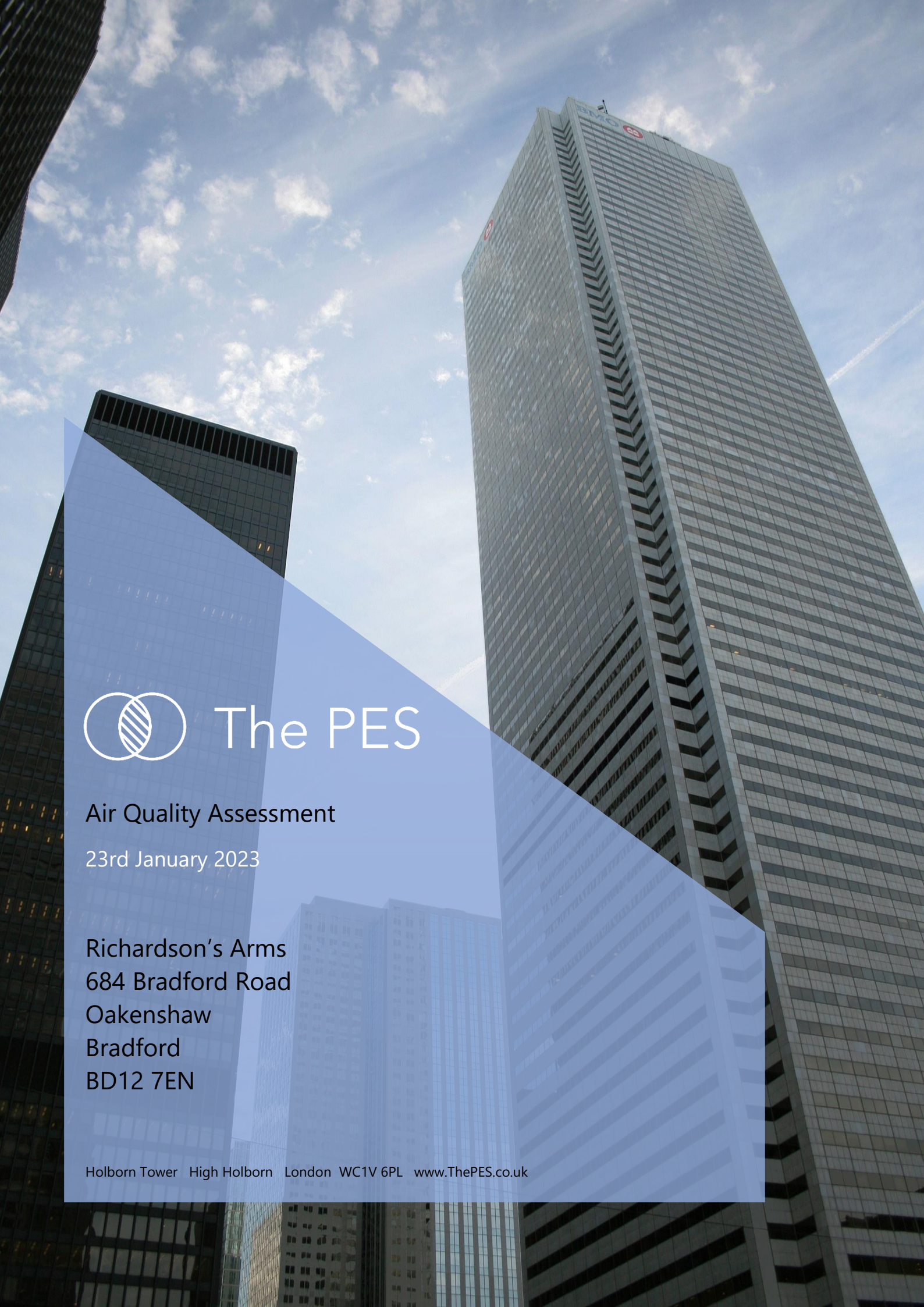

The PES

Air Quality Assessment

23rd January 2023

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Appendices

1.0 Executive Summary

The project clients have commissioned The PES Ltd to undertake a review of the air quality for occupants of the residential accommodation at the former Richardsons Arms at Oakenshaw.

The Applicants wish to apply to convert the vacant former public house into apartments and build 5 houses each with parking and gardens on the car park and surrounding land.

During the construction phase, the site has the potential to generate dust nuisance beyond the application boundary. However, through the implementation of a Dust Management Plan, the impacts will be effectively minimised and are unlikely to be significant.

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Traffic generated by the proposed development is not expected to significantly affect local air quality as traffic movements generated are expected to very minimal given the proposed uses/occupiers and site location – occasional deliveries and private journeys only.

However, detailed dispersion modelling of traffic on the local network confirms that, at the time of project delivery, the project will not be subject any issues associated with poor air quality and the design team are able to utilise a natural ventilation strategy if desired.

Heat and hot water will be supplied to the whole development through zero emission electrically driven systems , having zero impact on local air quality.

2.0 Introduction

This report presents an assessment of the local air quality for occupants of the new residential development at the Richardsons Arms.

The Applicants wish to apply to convert the vacant former public house into apartments and build 5 houses each with parking and gardens on the car park and surrounding land.

The planning authority have noted that:-

Air Quality Impact Assessment and Noise Impacts assessments are both required up front as they could be quite contentious issues given the site being set so close to the M606. Whilst we accept these can be conditioned on occasion, we need this to be addressed prior to determination given the risks from the motorway. This should follow national and WYLES (West Yorkshire Low Emissions Strategy) guidance and standards).

The location of the proposed development site is presented in Figure 1.

Fig 1. Site Location Plan

The project sits within the administrative boundary of the City of Bradford MDC.

Bradford currently has 4 AQMAs. These are located close to the city centre at Manningham Lane, Thornton Road, Mayo Avenue / Manchester Road and Shipley Airedale Road.

After declaration of the AQMAs Bradford prepared an Air Quality Action Plan (AQAP). This policy document confirms that poor air quality can contribute to poor health particularly among vulnerable people such as the very young, the old and anyone with underlying cardio-vascular health issues such as asthmatics and others.

At the same time it recognises that Bradford also has an important role to play to ensure that air quality remains good in areas that are not AQMAs and to ensure that air quality improves in all locations across the district. To ensure that air quality is managed appropriately Bradford believes it should commit to:

- Developing an Air Quality Strategy. This would have the key aims that development planning and local transport planning should continue to adopt appropriate policies and measures aimed at improving air quality wherever possible (across the district and within the AQMAs in particular) and that planning decisions should not lead to the declaration of new AQMAs.

Implementing complementary local measures such as:

- Adopting a low emission strategy when procuring and operating vehicles and services requiring the use of vehicles
- Adopting practices within a Freight Strategy that focus on reducing emissions from freight within Bradford by helping freight move efficiently and to encourage the uptake of cleaner vehicles and Reducing congestion in the AQMAs
- Such measures may allow fleet operators to cut costs in addition to reducing emissions.
- Achieving better travel choices in the District by making information on purchasing and travel choices more readily available and by continuing to actively engage with all parts of the community (individual, institutional and commercial) to implement more sustainable travel plans.

It is noted that The Richardsons Arms is NOT within an identified AQMA

3.0 Policy Context

An overview of the relevant policy drivers for the assessment is provided in the following section.

An overview of the relevant policy drivers for the assessment is provided in the following section.

3.1 European Legislation

Within the European Union, ambient air quality is currently regulated through the Ambient Air Quality Directive 2008/50/EC and the Fourth Daughter Directive 2004/107/EC. These directives set limit values and target values for ambient pollutant concentrations. The limit values are legally binding and must not be exceeded, whereas the target values are to be attained where it is cost effective to do so.

The Ambient Air Quality Directive provides limit values for sulphur dioxide (SO2), nitrogen dioxide (NO_2), benzene (C_6H_6), carbon monoxide (CO), lead (Pb) and particulate matter (PM_{10} and $PM_{2.5}$). The Fourth Daughter Directive provides target values for arsenic (As), cadmium (Cd), nickel (Ni), benzo(a)pyrene (B(a)P), mercury (Hg) and polycyclic aromatic hydrocarbons (PAH).

The EU limit values have been adopted into UK law via the Air Quality Standards Regulations 2010.

In the context of the proposed development, the primary pollutants of concern are NO_2, PM_{10} and $PM_{2.5}$ from traffic on roads close to the site. A summary of the European limit values for the protection of human health for these pollutants is presented in Table 1.

Table 1: European Limit Values for the Protection of Human Heath

Pollutant	Averaging Period	Limit Value ($\mu g/m^3$)	Comments
NO_2	1 Hour	200	Not to be exceeded more than 18 times per calendar year (equivalent to the 99.8th percentile of 1-hour means)
	Calendar Year	40	
PM_{10}	24 Hour	50	Not to be exceeded more than 35 times per year (equivalent to the 90.4th percentile of 24-hour means)
	Calendar Year	40	
$PM_{2.5}$	Calendar Year	25	Stage 1 LV (to be met by 01/01/15)
	Calendar Year	20	Stage 2 LV (to be met by 01/01/20)

3.2 National Legislation

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

The Air Quality Strategy for England, Wales and Northern Ireland was published in 2007 and sets out policy targets (objectives) for SO2, NO2, C6H6, CO, Pb, PM10, PM2.5, 1,3-butadiene (C4H6) and PAH. These objectives are generally in line with those set by the European Directives, although more stringent particulate and benzene objectives apply in Scotland (and in Northern Ireland for benzene).

The Air Quality Objectives (AQO) for NO2, PM10 and PM2.5 in England do not differ from those presented in Table 1.

Local Air Quality Management

The framework for Local Air Quality Management (LAQM) in the UK was introduced by the Environment Act 1995. Local Authorities are required to regularly review and assess air quality to establish whether there are any locations where pollutant concentrations exceed the relevant air quality objectives or EU limit values.

Where an exceedance is identified the local authority is obliged to declare an Air Quality Management Area (AQMA) and prepare an Action Plan setting out measures to improve air quality and achieve compliance with the objective(s).

The National Planning Policy Framework

The National Planning Policy Framework (NPPF 2021) sets out the Government's policies for planning and how these should be applied. With regard to air quality, the NPPF states that:-

para. 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.

3.3 Regional Policy

The key document relating to air quality is the West Yorkshire Low Emissions Strategy (2016 to 2021).

The West Yorkshire Low Emissions Strategy (WYLES) has been developed through collaboration between the West Yorkshire local authorities (Bradford MDC, Calderdale MBC, Kirklees MDC, Leeds CC and Wakefield MDC); West Yorkshire Combined Authority (WYCA) and Public Health England (PHE), with each organisation having an input and contributing to the content of the Strategy.

This Strategy document has four main sections:

- Evidence for Change
- Creating a Low Emission Future
- Tackling Transport Emissions
- Delivery and Funding of the WYLES

Al designed to improve the air quality in and around the associated Councils areas.

3.4 Local Planning Policy

The Core Strategy Development Plan Document (DPD) was adopted in 2017 though some of the policies contained within the preceding Replacement Unitary Development Plan (RUDP) remain applicable until adoption of Allocations and Area Action Plan DPDs.

Specific policy areas include:-

Strategic Core Policy 2 (SC2): Climate Change and Resource Use
Planning decisions as well as plans, strategies, investment decisions, programmes should:

6. Aiming to improve air quality overall, to integrate road transport emission reduction into decision making and to address the impact of climate change on buildings, public spaces and vulnerable groups.

Policy EN8: Environmental Protection

In order to protect public health and the environment the Council will require that:

Proposals which are likely to cause pollution or are likely to result in exposure to sources of pollution (including noise, odour and light pollution) or risks to safety, will only be permitted if measures can be implemented to minimise pollution and risk to a level that provides a high standard of protection for health, environmental quality and amenity. The following issues require particular attention:

A. Air Quality

In liaison with partner organisations, the Council will take a proactive approach to maintaining and improving air quality within the District in line with both National Air Quality Standards, the European Union limit values and the principles of best practice. Through a range of actions, It will seek to secure a reduction in emissions from sources which contribute to poor air quality. Development proposals that have the potential to adversely impact on air quality will be required to incorporate measures to mitigate or offset their emissions and impacts, in accordance with the Low Emission Strategy for Bradford and associated guidance documents.

In areas where air quality is a matter of concern, development proposals will be required to deliver a positive impact on air quality in the district. Development proposals must not exacerbate air quality beyond acceptable levels; either through poor design or as a consequence of site selection.

4.0 Methodology

This section outlines the assessment methodology, taking into account all relevant national and local policies and technical guidance relating to air quality.

Specific guidance is taken from the Air Quality & Emissions Technical Planning Guidance (Part of the West Yorkshire Low Emissions Strategy).

This technical guidance forms part of the development of an overarching Low Emissions Strategy to reduce road transport emissions in West Yorkshire. It is aimed at helping planning authorities deliver national air quality objectives through cost effective service planning brought about by the joint working and individual policy set out in each authority's Local Plan policies.

The guidance provides a template for integrating air quality considerations into land-use planning and development management policies that can influence the reduction of road transport emissions and to be used to update air quality action plans.

The air quality assessment process follows a three stage process:

1. Determining the classification of the development proposal;
2. Assessing and quantifying the impact on local air quality;
3. Determining the level of a mitigation required by the proposal to meet Local Development Plan requirements.

The assessment process is summarised in the flow chart overleaf.

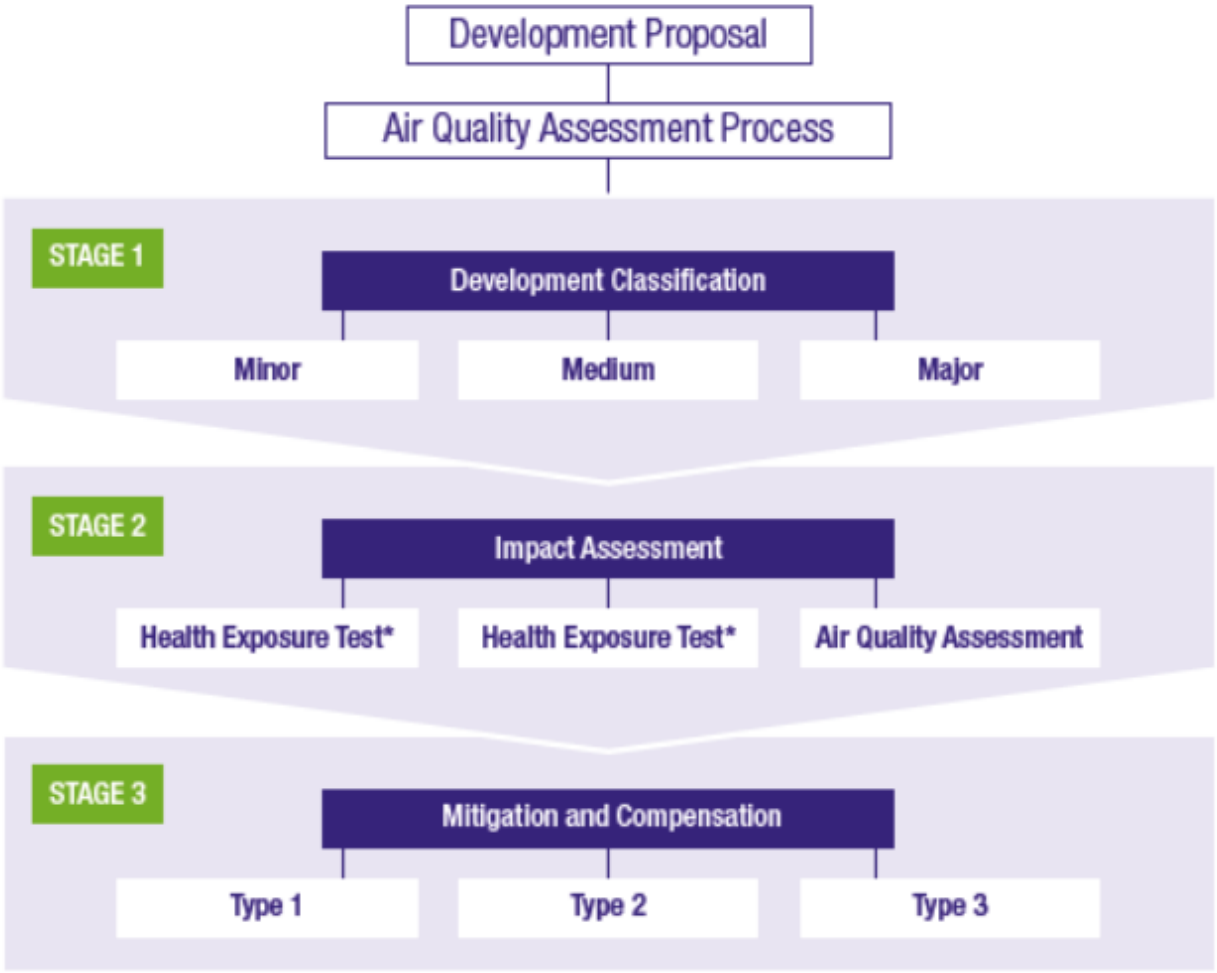

Fig 2 - The Air Quality Assessment and Mitigation Flow Chart

4.1 Construction Dust

The potential impact of dust generated during site enabling, earthworks and construction works at the proposed development has been undertaken in accordance with the Institute of Air Quality Management (IAQM) construction dust guidance . A full description of the construction dust methodology is provided in **Appendix A** – IAQM Construction Dust Methodology.

A detailed assessment of dust impacts is required where there are human or ecological receptors within:

- 50m of the site boundary; or
- 50m of the route(s) used by construction vehicles on public roads, up to 500m from the site entrance(s).

The IAQM/ SPG methodology allows the potential risk of dust soiling and human health effects to be determined, based primarily on the sensitivity of nearby receptors (human and ecological) and the anticipated magnitude of the dust emission due to:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (re-suspended dust from vehicle movements).

The assessment of dust risk is also based on professional judgement taking into account factors such as the prevailing wind direction, the proposed construction phasing, the likely duration of dust raising activities, local topography and existing air quality.

A range of best practice mitigation measures are provided within the guidance, which are dependent on the level of dust risk attributed to the site. It is recommended that these measures are incorporated into a Dust Management Plan (DMP) for the proposed development.

The significance of the residual impacts following appropriate mitigation is determined by professional judgement.

Best Practice Guidance for dust control will be implemented, as appropriate, during the construction phase through the Dust Management Plan (DMP) for the proposed development.

The risk of dust soiling and human health impacts from the site has been assessed as medium:-

- Development of between 1,000 and 15,000 square metres of land and;
- Development of between ten to 150 properties and;
- Potential for emissions and dust to have an intermittent or likely impact on sensitive receptors

Prior to mitigation, therefore in accordance with the IAQM guidance it is recommended that the measures detailed in the table below are incorporated into the DMP. The significance of dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is considered to be negligible.

4.2 Construction Traffic

Construction traffic will contribute to existing traffic levels on the surrounding road network. However, the temporary increase in traffic is considered unlikely to be significant in terms of total flow or construction duration.

All non-road mobile machinery (NRMM) should use fuel equivalent to ultra-low sulphur diesel (ULSD), especially where a bunkered fuel supply is available.

The impact of vehicular emissions of NO_2 and PM10 from construction traffic and on-site machinery on local air quality is considered to be negligible, as a low volume temporary source of local pollution.

Construction traffic is not included within the screening requirements of Table 4.1 – Screening Assessment of Road Traffic Sources within the Technical Guidance 2016 (LLAQM.TG (16)).

Potential dust emission associated with construction traffic are considered further, in line with the IAQM guidance and section 6.0 below.

4.3 Operational Traffic

The Environmental Protection UK (EPUK)/ IAQM planning guidance states that for developments within or near an AQMA, a detailed assessment of traffic-related impacts is required where:

- There is a change in the annual average daily traffic (AADT) flow of light goods vehicles (LGV) of more than 100 vehicles; and/or
- There is a change in the AADT flow of heavy goods vehicles (HGV) of more than 25 vehicles; and/or There is a change in the road re-alignment by more than 5m; and/or
- A new junction is introduced, which will significantly alter vehicle speeds.

The project at Richardsons Arms does not trigger any of the above requirements.

However, recognising the LPA's concerns with the location of the project close to the M606, dispersion modelling of baseline traffic on the surrounding major road network has been undertaken to predict pollutant concentrations at the proposed development site to determine whether the site is suitable for the office and residential use, as proposed.

The input parameters for the modelling are detailed in **Appendix B** – ADMS-Roads Input Parameters.

4.4 Emission Factors

Concentrations of NOx, PM_{10} and $PM_{2.5}$ have been predicted using vehicle emission factors from version 10.1 of the Emissions Factor Toolkit. The emission factors predict a gradual decline in pollution levels over time due to improvements in emissions abatement technologies and the gradual renewal of the vehicle fleet.

However, monitoring carried out in urban areas throughout the UK have found that NO_2 concentrations are not declining as rapidly as predicted and in some locations, roadside concentrations have increased.

The predicted NOx concentrations have been converted to NO_2 using version 8.1 of the NOx to NO_2 calculator, available from the Defra air quality website. It should be noted that version 8.1 should only be used with the 2018 reference year background maps and the Emissions Factors Toolkit v10.1 onwards.

It should be noted that the Emission Factors Toolkit V11.0 was released in November 2021, but the corresponding NOx to NO_2 calculator is not yet available to enable assessments to be undertaken.

The baseline dispersion modelling has been based on the year **2019**, with background emissions, traffic data selected accordingly.

4.5 Meteorological Data

The assessment has used hourly sequential meteorological data from Bradford Airport, which is approximately 15km north east of the proposed development.

4.6 Sensitive Receptors

Pollutant concentrations have been predicted across the development site using a Cartesian receptor grid of 5m resolution.

4.7 Verification

There is an inherent level of uncertainty associated with any assessment process; however, the methodology presented has been developed to minimise errors where possible.

Potential errors in predicted concentrations due to uncertainties in the assessment source activity data (e.g. traffic flows and emission factors) and the estimated background concentration are minimised by the verification of modelled concentrations using local monitoring data.

The 2016 Local Air Quality Management Technical Guidance (LAQM.TG16) recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between modelled and measured concentrations, it is considered necessary to adjust the model results to more accurately reflect local air quality.

However – see below – there are no monitoring stations in the vicinity of the proposed development, nor along any point of the M606 approaching Bradford city centre.

It has therefore that a valid verification process cannot be undertaken.

4.8 Building-related Emissions

The development heating and DHW systems are 100% electrically driven, and as such, will emit zero local emissions; having no impact on occupants of the subject building or neighbouring sensitive receptors.

5.0 Baseline Air Quality

Through an analysis of local monitoring data, a description of existing air quality in the vicinity of the proposed development is provided.

5.1 Local Air Quality Monitoring

5.1.1 Automatic Data

Bradford operate 7 automatic roadside monitoring sites; all of which are concentrated in central Bradford of within other major conurbations. None of which are deemed to offer any relevance to the Richardsons Arms rural location, adjacent to the M606.

Table 2: Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM2	Keighley	Urban Centre	406058	441273	NO2; PM10	NO	Chemiluminescent	n/a	5	2.7
CM3	Manningham Lane	Roadside	415582	434457	NO2	YES, AQMA order 2, CAZ	Chemiluminescent	4	1.5	1.5
CM4	Manchester Road / Mayo Avenue	Roadside	415933	430569	NO2	YES, AQMA order 1, CAZ	Chemiluminescent	5	3.5	1.5
CM5	Thornton Road	Roadside	415870	433054	NO2	YES, AQMA order 3, CAZ	Chemiluminescent	0	2	1.5
CM6	Shipley Airedale Road	Roadside	416974	433245	NO2; PM10	YES, AQMA order 4, CAZ	Chemiluminescent	2	2	2.7
CM7	Rook Lane	Roadside	417860	430705	NO2	NO, CAZ	Chemiluminescent	1	1.5	1.5
CM8	Tong Street	Roadside	419188	430213	NO2; PM10	NO, CAZ	Chemiluminescent	0	5.8	2.7

5.1.2 Non-automatic Data

Bradford also operates a very significant network of passive monitoring tubes.

Again, none of the site are in the locale of the development site, nor is there any monitoring undertaken around the M606.

5.1.2 DEFRA Mapped Background Concentrations

For comparison with the background monitoring data for NO_2 and in the absence of local PM_{10} and $PM_{2.5}$ data, concentrations have been obtained from the Defra UK Background Air Pollution maps.

These 1km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites.

A summary of the mapped and measured annual mean background concentrations for the proposed development site is presented in Table 3, together with the concentrations assumed for the purposes of the assessment.

Table 3: Defra Mapped, Measured and Assessment Background Pollutant Concentrations (µg/m3)

Pollutant	2019 Mapped	2019 Measured	Assessment	AQO/EAL
NO_2	17.89	n/a	17.89	40
PM_{10}	15.07	n/a	15.07	40
$PM_{2.5}$	9.62	n/a	9.62	25

6.0 Potential Impacts

The potential impacts and significance of these impacts on air quality during the construction phase of the development are identified in this section. Suggested mitigation measures are outlined in a subsequent section of the report.

6.1 Construction Dust

6.1.1 Sensitivity of the Area to Dust Impacts

The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. The area has low density residential accommodation as part of the surrounding context; these occupants, would be considered as **HIGH** sensitivity receptors.

Accordingly, it can be assumed that, with 10-100 high sensitivity receptors that are within 100m of the site boundary, the sensitivity of the area to dust soiling effects on people and property could be considered **LOW.**

Finally, for the potential range of sensitive receptors in the range of 10-100 within 100m of the development site, and with the background PM levels at <24µg/m^3, sensitivity of the area to human health impacts would be considered **LOW.**

Figure 3 – Local sensitive receptors - Proposed development site – Sensitive Receptors

The precise behaviour of the dust, its residence time in the atmosphere and the distance it may travel before being deposited, will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

6.1.2 Dust Emission Magnitude

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk.

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

- the scale and nature of the works, which determines the potential dust emission
- magnitude as small, medium or large (see Table 4);

and

- the sensitivity of the area to dust impacts, which is defined as low, medium or high sensitivity.

Table 4 – Dust emission risk categories

Activity	Dust Emission Class		
	Large	Medium	Small
Demolition	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level	Total building volume 20,000 – 50 000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months
Earthworks	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes	Total site area 2,500 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months
Construction	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting	Total building volume 25,000 m3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Track out	>50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m	10 – 50 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100 m;	<10 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50 m.

These factors are combined to determine the risk of dust impacts with no mitigation applied (see Table 6 below). The risk category assigned to the development can be different for each of the four potential activities (demolition, earthworks, construction and trackout).

Demolition - the demolition works are very limited, just a couple of low rise outbuildings to be removed – no more than 100m^3 in total

Accordingly, the magnitude of the dust emission is considered to be 'small'.

Earthworks - the project will involve the development of the foundations for the row of new houses.

Volume of material moved will not exceed 1,000t and the use of significant use of earth moving vehicles unlikely for such limited development proposals.

With a site area at less just 1,750m^2, the magnitude of the dust emission during the earthworks phase is therefore also considered to be 'small'.

Construction - Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build.

The proposed development will consist of the internal conversion of the existing public house, and a row of new dwellings.

With limited new build activity, concrete batching on site is highly unlikely.

The development is of a small scale - circa 2,000m^3 – overall the magnitude of the emission during construction is considered to be 'small'.

Trackout – the site is about 40m deep, so unpaved roads will be less than 50m, and given scale of proposals, vehicle movements will not exceed 10 per day - dust emissions will be "small".

Table 5: Risk of Dust Impacts Prior to Mitigation

Dust Source	Emissions Magnitude
Demolition	Small
Earthworks	Small
Construction	Small
Track Out	Small

6.1.3 Assessment of Dust Risk Prior to Mitigation

Referring to Chapter 7 of the IAQM "Assess the Risk of Dust Impacts" – tables 3 – 9; a summary of the potential risk of dust impacts prior to mitigation, based on the low sensitivity of the area to dust soiling and human health impacts is presented in Table 6.

Table 6: Risk of Dust Impacts Prior to Mitigation

Dust Source	Emissions Magnitude	Human Health Risk	Dust Soiling Risk
Demolition	Small	Negligible	Negligible
Earthworks	Small	Negligible	Negligible
Construction	Small	Negligible	Negligible
Track Out	Small	Negligible	Negligible

6.2 Air Quality Assessment (AQA)

6.2.1 Scheme Classification

The first stage of the AQA is to consider scheme classification, the first stage of which is to consider the scale of the project against Table 1 within the Air Quality and Planning Technical Guidance.

The table is reproduced below – Figure 4.

It can be clearly identified that the proposal for 10 new dwellings at The Richardson's Arms – not in a AQMA - would be considered MINOR development.

Table 1: Criteria for Development Classification

Land Use	Description	Criteria
Food Retail (A1)	Retail sale of food goods to the public – supermarkets, superstore, convenience food store	>800 m2 (GFA)
Non-Food Retail (A1)	Retail sale of non-food goods to the public; but includes sandwich bars or other cold food purchased and consumed off site	>1500 m2(GFA)
Financial and professional services (A2)	Banks, building societies and bureaux de change, professional services, estate agents, employment agencies, betting shops.	>2500 m2(GFA)
Restaurants and Cafes (A3)	Use for the sale of food for consumption on the premises.	>2500 m2(GFA)
Drinking Establishments (A4)	Use as a public house, wine-bar for consumption on or off the premises.	>600 m2(GFA)
Hot Food Takeaway (A5)	Use for the sale of hot food for consumption on or off the premises.	>500 m2(GFA)
Business (B1)	(a) Offices other than in use within Class A2 (financial & professional). (b) Research & development – laboratories, studios. (c) Light industry	>2500 m2(GFA)
General industrial (B2)	General industry (other than B1).	>4000 m2(GFA)
Storage or Distribution (B8)	Storage or distribution centres – wholesale warehouses, distribution centres & repositories.	>5000 m2(GFA)
Hotels (C1)	Hotels, boarding houses & guest houses	>100 bedrooms
Residential Institutions (C2)	Hospitals, nursing homes used for residential accommodation and care.	>50 beds
Residential Institutions (C2)	Boarding schools and training centres	>150 students
Residential institutions (C2)	Institutional hostels, homeless centres.	>400 residents
Dwelling Houses (C3)	Dwellings for individuals, families or not more than six people in a single household.	>50 units
Non-Residential Institutions (D1)	Medical & health services, museums, public libraries, art galleries, non-residential education, places of worship and church halls.	>1000 m2(GFA)
Assembly and Leisure (D2)	Cinemas, dance & concert halls, sports halls, swimming, skating, gym, bingo, and other facilities not involving motorised vehicles or firearms.	>1500 m2(GFA)
Other 1. Any development generating 30 or more two-way vehicle movements in any hour 2. Any developments generating 100 or more two-way vehicle movements per day 3. Any development proposing 100 or more parking spaces 4. Any relevant development proposed in a location where the local transport infrastructure is inadequate 5. Any relevant development proposed in a location adjacent to an Air Quality Management Area (AQMA)		

1. MINOR: Development proposals that fall below the above criteria.

Figure 4 – Scheme Classification Table

6.2.2 Air Quality Impact Assessment

MINOR and MEDIUM Classified Proposals:

Smaller development proposals may not in themselves create an additional air quality problem but will add to local air pollution and potentially introduce more people likely to be exposed to existing levels of poor air quality. An assessment of the likelihood of introducing additional exposure will be determined using the following criteria:

- The proposal is adjacent to or within an AQMA;
- The proposal is in a location 20m from roads at or above the relevant national objective highlighted on the DEFRA GIS modelled maps (http://uk-air.defra.gov.uk/data/gismapping).
- The proposal is one of the Land Use types:
- C1 to C3 in table 1;
- C4 (Homes of Multiple Occupation);
- D1 in table1.

And within 20m of roads with >10,000 AADT (Annual Average Daily Traffic).

As noted above, the Richardsons Arms site is not within an AQMA, but is adjacent to the M606.

At scheme of only 10 dwellings, no transport assessment has been undertaken.

The DEFRA GIS Maps do not have Roadside data for NOx, PM10 or PM2.5 at the at this location; as a result, the $N0_2$ fall-off calculations cannot be undertaken.

However, the AADT figure for the M606 are subject to local traffic counts, and 77,000 + daily vehicle movements; accordingly, in line with the technical guidance, mitigation is required.

In addition, given the concerns expressed by the planning authority in regard to the site location, dispersion modelling of local traffic emissions has been undertaken.

The baseline year has been selected as 2019, the last year for which reliable data is available prior to the Covid 19 lockdown period and the impact on traffic volumes.

6.3 Baseline Traffic - 2019

Predicted annual mean NO_2 concentrations have been considered for the proposed commercial and residential accommodation.

The levels have been assessed at the commercial ground floor level across the site – 5th floor level and are presented as a contour plots in Figures 5-7 below

The modelled outputs strongly suggest that for the 2019 baseline, ground floor NO_2 levels are clearly less than 30µg/m^3 across the development footprint - noting that the commercial spaces are not required to comply with the long terms air quality objectives.

Predicted ground floor level annual mean PM_{10} and $PM_{2.5}$ concentrations are also well within the relevant air quality standards across the site, with PM_{10} levels at less than 17µg/m^3 and $PM_{2.5}$ at 11µg/m^3 or lower.

Even allowing for a very significant error factor in the above modelling, the above emissions levels would remain will within the required air quality objectives.

Short term concentrations of NO_2 and PM_{10} where modelled at the proposed development façade closest to the M606 at grid reference 417498-427834 at ground floor level.

Max short term NO_2 levels are predicted level to be 143.44µg/m^3 with no exceedances – within acceptable limits for the retail and access areas, while PM_{10} levels do not exceed 17.73µg/m^3, well within AQO. These figures would of course reduce at higher levels.

Figure 5 – NO_2 concentrations – ground floor

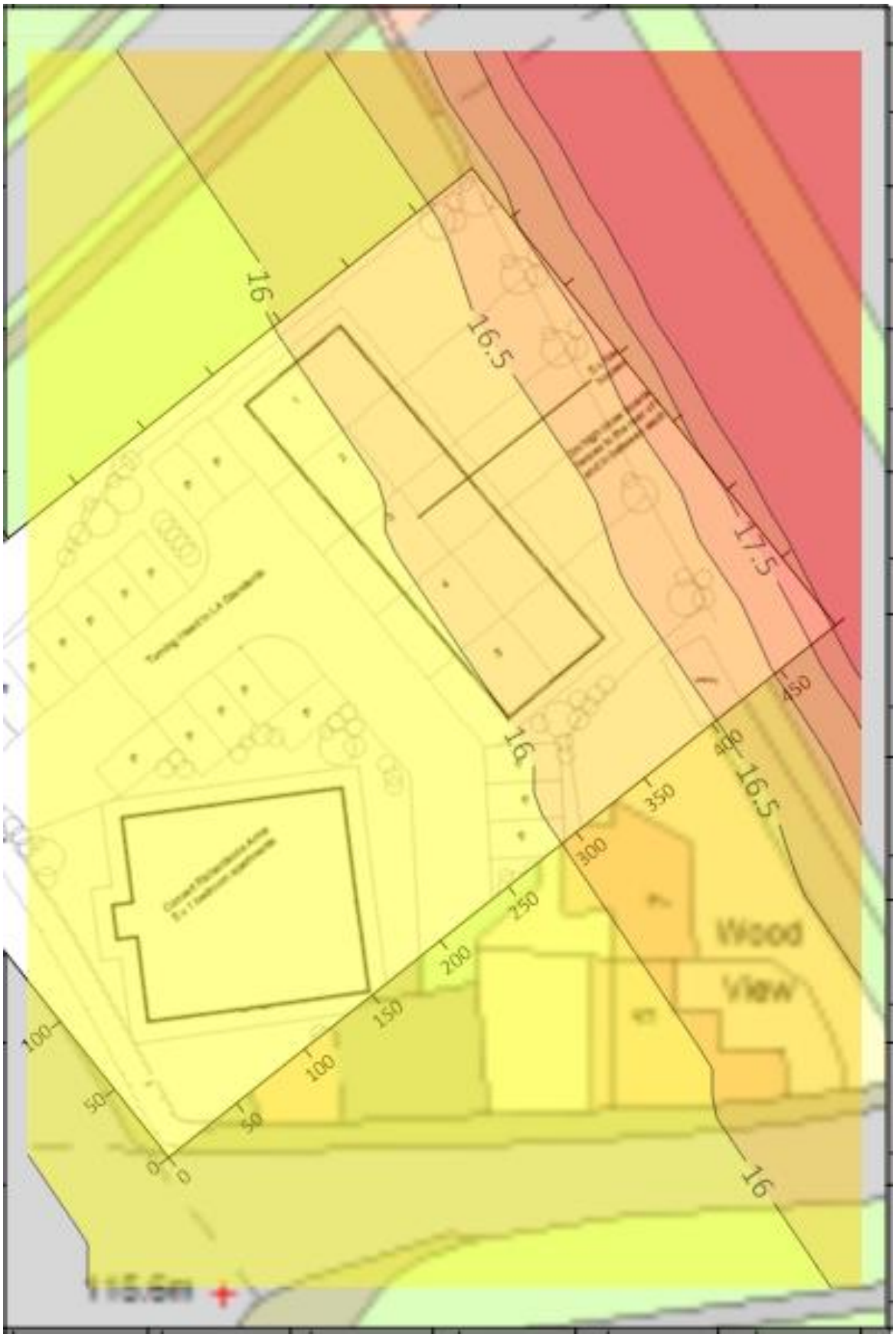

Figure 6 - PM_{10} concentrations – ground floor

Figure 7 – PM2.5 Concentrations – ground floor

7.0 Mitigation

The following mitigation measures will be required during the construction and operational phases in order to minimise the air quality impacts arising from the development.

7.1 Construction Phase

London Best Practice Guidance for dust control will be implemented, as appropriate, during the construction phase through the Dust Management Plan (DMP) for the proposed development.

The risk of dust soiling and human health impacts from the site has been assessed as **"Negligible"** prior to mitigation, therefore in accordance with the IAQM guidance, not specific mitigation is required.

However it is recommended that the measures detailed in Table 7 are incorporated into the DMP. The significance of dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is considered to be negligible.

Table 7 Recommended Mitigation Measures

Description	Mitigation Measure
General	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary; this may be the environment manager/engineer or the site Manager. • Display the head or regional office contact information.
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. • Make the complaints log available to the local authority when asked. • Record any exceptional incidents that cause dust and/or air emissions, either on or offsite, and the action taken to resolve the situation in the log book.
Monitoring	• Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.

	• Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and maintaining the Site	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Erect solid screens or barriers around dusty activities or at the site boundary that is at least as high as any stockpiles on site. • Avoid site runoff of water or mud.
Operating vehicle & machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles. • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Waste management	• Avoid bonfires and burning of waste materials
Demolition	• Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. • Bag and remove any biological debris or damp down such material before demolition.

7.1.1 Method Statement

A method statement should cover all phases of the development and take account of all contractors or sub-contractors. It should be submitted to the local planning authority (LPA) prior to any works being carried out and include a timetable of dust generating activities accompanied with proposed dust control measures.

The content of a Method Statement will be determined by a site specific evaluation but typical features to include are outlined below:-

- summary of work to be carried out
- description of site layout and access – including proposed haul routes, location of site equipment including supply of water for damping down, source of water (wherever possible from dewatering or extraction), drainage and enclosed areas
- inventory and timetable of all dust generating activities
- list of all dust and emission control methods to be used
- details of any fuel stored on site
- Identification of an authorised responsible person on-site for air quality. Ideally this person needs to have knowledge of pollution control and vehicle emissions;
- a site log book to record details and action taken in response to exceptional incidents or dust-causing episodes. It should also be used to record the results of routine site inspections.

7.2 Operational Phase

The site already has the benefit of a vegetation boundary between it and the M606.

The proposed development will include additional secure cycle spaces to encourage sustainable transport, as well as EV charging points for each dwelling.

Detailed dispersion modelling of local traffic flows indicates that long term NO_2 levels are likely to within the relevant air quality standards and these will drop further in the coming years,

PM_{10} and $PM_{2.5}$ concentrations at the site are also likely to be well within the relevant short and long-term air quality standards for the project.

Finally, the principle contractor will implement the above noted best practices for control of dust emissions from the site.

accordingly it is considered that site is appropriate for the residential uses as proposed.

8.0 Summary and Conclusions

The following summarise the outcomes of the assessment and provide details of any air quality constraints to the development of the site. Based on the results of the assessment, it is considered that redevelopment of the site would not cause a significant impact on local air quality.

An assessment has been undertaken to assess the potential impacts on local air quality associated with the construction and operation of the proposed development.

An assessment of the potential impacts during the construction phase has been carried out in accordance with the latest Institute of Air Quality Management guidance; this has shown that releases of dust and PM_{10} are likely to occur during site activities, but the risks have been assessed as low.

Through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases may be effectively mitigated and the resultant impacts are considered to be negligible.

Traffic generated by the proposed development is expected to be very limited and would not significantly affect local air quality, however detailed dispersion modelling of the local road network has been undertaken to assess whether the site is suitable for the residential uses, as proposed.

The modelling indicates that both long and short term air quality standards are within the targets for C3 spaces as set by the Air Quality Standards Regulations 2010.

It is also expected that long term air quality standards will be well within the required targets for the year of opening, given the constantly improving air quality in the UK.

Appendix A

IAQM CONSTRUCTION DUST METHODOLOGY

Factors defining the sensitivity of a receptor to dust impacts are presented in Table A1.

Table A1: Receptor Sensitivity

Receptor Sensitivity	Human Health	Dust Soiling	Ecological
High	- Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) - Examples include residential dwellings, hospitals, schools and residential care homes.	- Regular exposure - High level of amenity expected. - Appearance, aesthetics or value of the property would be affected by dust soiling. - Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	- Nationally or Internationally designated site with dust sensitive features (b) - Locations with vascular species (c)
Medium	- Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} (a) - Examples include office and shop workers (d)	- Short-term exposure - Moderate level of amenity expected - Possible diminished appearance or aesthetics of property due to dust soiling - Examples include parks and places of work	- Nationally designated site with dust sensitive features (b) - Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	- Transient human exposure - Examples include public footpaths, playing fields, parks and shopping streets	- Transient exposure - Enjoyment of amenity not expected. - Appearance and aesthetics of property unaffected - Examples include playing fields, farmland (e), footpaths, short-term car parks and roads	- Locally designated site with dust sensitive features (b)

a) In the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more in a day.
b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).
c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.
d) Does not include workers' exposure to PM_{10} as protection is covered by Health and Safety at Work legislation.
e) Except commercially sensitive horticulture.

The sensitivity of the area as a whole is dependent on the number of receptors within each sensitivity class and their distance from the source. Human health impacts are also dependent on the existing PM_{10} concentrations in the area.

Table A2 and Table A3 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively. The sensitivity of the area to ecological impacts is presented in Table A4.

Table A2: Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Table A3: Sensitivity of the Area to Health Impacts from Dust

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

Table A4: Sensitivity of the Area to Ecological Impacts from Dust

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

The magnitude of the dust impacts for demolition, earthworks, construction and trackout is classified as small, medium or large depending on the scale of the proposed works as detailed in Table A5.

Table A5: Dust Emission Magnitude

Receptor Sensitivity	Large	Medium	Small
Demolition	- Total building volume >50,000m^3 - Potentially dusty material (e.g. concrete) - Onsite crushing and screening - Demolition activities >20m above ground level.	- Total building volume 20,000 - 50,000m^3 - Potentially dusty material - Demolition activities 10 - 20m above ground level.	- Total building volume <20,000m^3 - Construction material with low potential for dust release - Demolition activities <10m above ground level - Demolition during wetter months
Earthworks	- Total site area >10,000m^2 - Potentially dusty soil type (e.g. clay) - >10 heavy earth moving vehicles active at any one time - Formation of bunds >8m in height - Total material moved >100,000 tonnes	- Total site area 2,500 - 10,000m^2 - Moderately dusty soil type (e.g. silt) - 10 heavy earth moving vehicles active at any one time - Formation of bunds 4 - 8m in height - Total material moved 20,000 - 100,000 tonnes	- Total site area <2,500m^2 - Soil type with large grain size (e.g. sand) - <5 heavy earth moving vehicles active at any one time - Formation of bunds <4m in height - Total material moved <20,000 tonnes - Earthworks during wetter months
Construction	- Total building volume >100,000m^3 - On site concrete batching - Sandblasting	- Total building volume 25,000 - 100,000m^3 - Potentially dusty construction material (e.g. concrete) - On site concrete batching	- Total building volume <25,000m^3 - Material with low potential for dust release (e.g. metal cladding or timber
Trackout	- >50 HGV movements in any one day (a) - Potentially dusty surface material (e.g. high clay content) - Unpaved road length >100m	- 10 - 50 HGV movements in any one day (a) - Moderately dusty surface material (e.g. silt) - Unpaved road length 50 - 100m	- <10 HGV movements in any one day (a) - Surface material with low potential for dust release - Unpaved road length <50m

a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes

For each dust emission source, the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts prior to mitigation as illustrated in Tables A6 and A7.

Table A6: Risk of Dust Impacts from Demolition, Earthworks and Construction

Area Sensitivity	Distance from the Source		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible Risk

Table A7: Risk of Dust Impacts from Trackout

Area Sensitivity	Distance from the Source		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible Risk
Low	Low Risk	Low Risk	Negligible Risk

Appendix B

ADMS-ROADS INPUT PARAMETERS

ADMS-Roads Input Parameters

Table A1: Summary of ADMS-Roads Input Parameters

Parameter	Value
ADMS-Roads Model Version	5.0.1.3
Vehicle Emission Factors	EFT v10.1
Meteorological Data	Hourly sequential data from Leeds Bradford Airport
Surface Roughness	1.0m
Monin-Obukhov Length	75m

Table A2: Summary of Traffic Data

Road Link	2019 AADT (hourly)	HGV/Buses – daily	Average Speed (kph)
M606	3220	7.1%	Car – 105 LGV – 100 Buses/HGV - 90

Fig 8 – modelled road network