The Seam – Phase 1

Air Quality Assessment

AUGUST 2022

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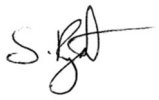

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1 Introduction

In May 2020 Barnsley Metropolitan Borough Council (BMBC) appointed a consultant team to prepare a new Development Blueprint for the site known as 'The Seam, Barnsley's Digital Campus'. The site is a 4.5 ha parcel of land located within Barnsley town centre, immediately adjacent to the Transport Interchange. The Digital Campus is home to DMC01, recently refurbished DMC02 and Barnsley College's new Scitech Digital Innovation hub. These buildings bring together digital and tech focused people, businesses, research and skills, enabling collaboration and innovation through a growing digital eco-system that operates on a regional, National and International level.

In October 2021 a multi-disciplinary team comprising of BDP and Arcadis with development consultants Aspinall Verdi were appointed to prepare concept designs for Phase 1, comprising of:

- Multi-Storey Car Park to RIBA Stage 2
- Active Travel Hub to RIBA Stage 2
- Public Realm to RIBA Stage 3
- Feasibility studies for development plots 1 and 2
- Road and services infrastructure to support the above

This assessment has been requested by BMBC to determine the impacts of Phase 1 on local air quality.

1.1 Site Location

The proposed development site forms part of the wider Seam Blueprint Masterplan area which is centred on the land either side of County Way, in the northeast quadrant of Barnsley town centre, shown in Figure 1.

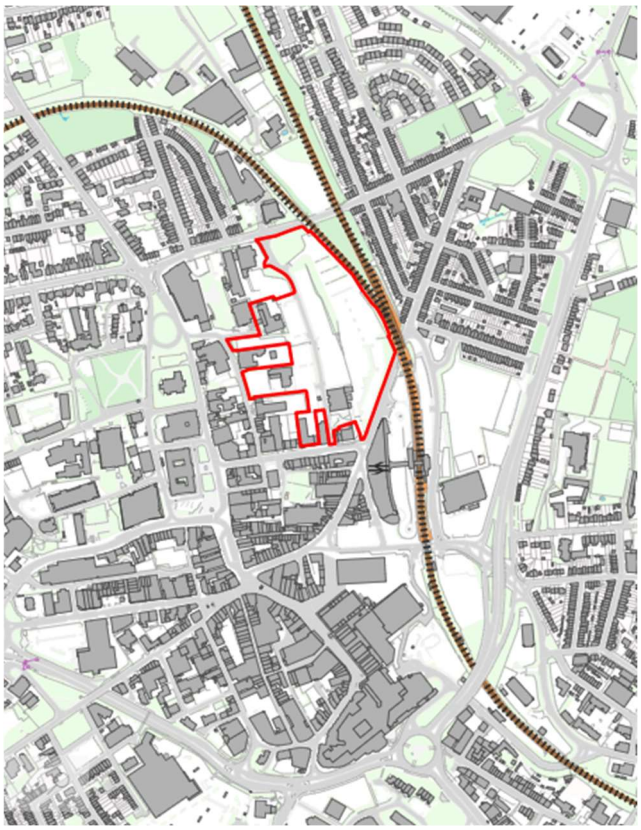

Figure 1 - Proposed development site boundary

2 Legislation and Policy

2.1 UK Legislation

Part IV of the Environment Act 1995 (amended 2021)[1] requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was published in July 2007[2]. The AQS sets out AQS objectives that are maximum ambient pollutant concentrations not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale.

The regulations referred to in the AQS have been supplemented by the Air Quality Regulations (2010), which came into force on 11th June 2010 and transpose the European Union (EU) Air Quality Directive (2008/50/EC) into UK law. Air Quality Limit Values (AQLVs) were published in these regulations for seven pollutants, in addition to Target Values for an additional five pollutants. These are generally in line with the AQS objectives, although the requirements for the determination of compliance vary.

Table 1 presents the AQS objectives for pollutants of relevance considered within this assessment.

Table 1 - Air Quality Strategy Objectives

Pollutant	Air Quality Strategy Objective	
	Concentration (µg/m^3)	Averaging Period
NO_2 (Nitrogen Dioxide)	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM_{10} (Particulate Matter less than 10 microns in diameter)	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year
$PM_{2.5}$ (Particulate Matter less than 2.5 microns in diameter)	25	Annual mean

Table 2 summarises the advice provided in Local Air Quality Management (LAQM) Technical Guidance (TG) (LAQM.TG(16))[3] on where the AQS objectives for pollutants considered within this report apply.

Table 2 - Examples of Where the AQS Objectives Apply

Averaging Period	Objectives Should Apply At	Objectives Should Not Apply At
Annual Mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access.

[1] Environment Act 1995, amended 2021. Available from: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted
[2] Defra (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.
[3] Defra (2021), Local Air Quality Management Technical Guidance (TG16)

Averaging Period	Objectives Should Apply At	Objectives Should Not Apply At
		Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-Hour Mean	All locations where the annual mean objective would apply, together with hotels and gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-Hour Mean	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

It is a requirement of the Environment Act that Local Authorities review current and future air quality within their area of jurisdiction under the system of LAQM as per LAQM.TG(16)[3]. Any areas of relevant exposure where the AQS objectives are not, or unlikely to be, achieved should be identified.

Where it is anticipated that an AQS objective will not be met, it is a requirement that an Air Quality Management Area (AQMA) is declared. Where an AQMA is declared, the Local Authority is obliged to produce an Air Quality Action Plan in pursuit of the achievement of the AQS objectives.

2.1.1 Dust

Generally, dust is only a cause of annoyance but when of sufficient scale and frequency, it may become a statutory nuisance. The relevant legislation dealing with statutory nuisance is given in Part III of the Environmental Protection Act 1990[4]. A statutory nuisance in relation to dust and deposits is defined under Section 79 of the act as follows:

"Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance.

…any accumulation or deposit which is prejudicial to heath or a nuisance".

[4] Section 79 of Part III of the Environmental Protection Act (1990)

Under the provisions of the Act, where a local authority is satisfied that a Statutory Nuisance exists, it is under a mandatory duty to serve an Abatement Notice requiring abatement or cessation of one or more activities deemed to be causing the nuisance. In the absence of any kind of standard, identification of a nuisance is dependent on the professional judgment of the local authority as to whether Best Practical Means (BPM) are being employed to control emissions. Where BPM is evident or can be clearly demonstrated then an activity cannot be deemed to be causing a Statutory Nuisance.

2.2 National Planning Policy

2.2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[5] sets out the Government's core policies and principles with respect to land use planning, including air quality. Paragraph 186 of the Framework states:

"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".

The National Planning Practice Guidance (NPPG)[6] supports the NPPF in order to make it more accessible. This guidance includes advice relating to: planning and air quality; the role of Local Plans with regard to air quality; when air quality is likely to be relevant to a planning decision; what should be included within an air quality assessment and how impacts on air quality can be mitigated. The assessment follows the guidance which contains recommendations when undertaking an air quality assessment for the purpose of applying NPPF policy.

2.3 Local Planning Policy

2.3.1 Barnsley Local Plan[7]

The Local Plan was adopted in January 2019. The following policies are relevant to air quality:

Policy Poll1 Pollution Control and Protection states:

"Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people. We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against."

Developers will be expected to minimise the effects of any possible pollution and provide mitigation

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[5] Ministry of Housing, Communities and Local Government (2021), National Planning Policy Framework

[6] Department for Communities and Local Government (2014), National Planning Practice Guidance. Available from: http://planningguidance.communities.gov.uk/blog/guidance/air-quality/

[7] Barnsley Metropolitan Borough Council (2019) https://www.barnsley.gov.uk/media/17249/local-plan-adopted.pdf

measures where appropriate.

Policy AQ1 Development in Air Quality Management Areas, which states:

"Development which impacts on areas sensitive to air pollution in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the development in terms of air quality (including residents, employees, visitors and customers), taking into account any suitable and proportionate mitigation required for the development. We will only allow residential development which impacts on areas sensitive to air pollution, where the developer provides an assessment that shows living conditions will be acceptable for future residents, subject to any required mitigation. We will only allow development which impacts on areas sensitive to air pollution which could cause more air pollution, where the developer provides an assessment that shows there will not be a significantly harmful effect on air quality, subject to any required mitigation. Furthermore, development which impacts on areas sensitive to air pollution due to traffic emissions will be expected to demonstrate suitable and proportionate mitigation relative to the increased traffic emissions generated by the development.".

3 Methodology

3.1 Construction Phase

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined in the Institute of Air Quality Management (IAQM) construction dust guidance[8]. The methodology is summarised in the following paragraphs and detailed assessment steps are presented in Appendix A.

If there are no ecological or human receptors within 350m of the application site boundary or within 50m of the haul routes (up to 500m from the site entrance(s)) then the need for a construction dust assessment is to be screened out. However, if there are receptors within in these distances then an assessment should be carried out.

The most common air quality impacts that may arise during demolition and construction activities are;

- Dust Deposition, resulting in the soiling of surfaces and reduction in amenity; and
- Elevated PM_{10} concentrations, as a result of dust generating activities on site.

These impacts may affect human and ecological receptors. The IAQM construction dust guidance[8] defines a human receptor as:

"Any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM_{10} over a time period relevant to the Air Quality Objectives. In terms of annoyance effects, this will most commonly relate to dwellings, but may also refer to other premises such as buildings housing cultural heritage collections (e.g., museums and galleries), vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations (e.g., salad or soft-fruit production)."

An ecological receptor is defined as:

"Any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (e.g., on foraging habitats)".

The risk of dust emissions from construction/demolition activities causing an adverse effect on human or ecological receptors depends on:

- The type of construction activities being undertaken, and the duration of these activities;
- The size of the construction site:
- The meteorological conditions (such as wind speed, wind direction and rainfall);
- The proximity of the receptors to the construction activities;
- The effectiveness of the dust deposition mitigation measures; and
- Receptors' sensitivity to dust.

Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;

[8] Institute of Air Quality Management (2014), Guidance on the Assessment of Dust from Demolition and Construction version 1.1

- Construction; and
- Trackout (the vehicle-borne transfer of mud and debris onto the highway).

The potential for dust emissions was assessed for each activity that is likely to take place and considers three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in exposure to PM_{10}.

3.2 Operational Phase

The development has the potential to impact on existing air quality as a result of changes in road traffic exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$, associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken using the criteria contained within the IAQM/EPUK guidance[9] to determine the potential for trips generated by the development to affect local air quality. The criteria to determine whether further assessment is required are as follows:

- A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or more than 500 AADT elsewhere;
- A change of Heavy Duty Vehicle (HDV) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- Realignment of roads where the change is 5m or more and the road is within an AQMA; or
- Introduction of a new junction or removal of an existing junction near to relevant receptors.

If these criteria are not exceeded, then the IAQM/EPUK guidance[9] considers air quality impacts associated with a scheme in terms of traffic emissions to be negligible and no further assessment is required.

Should screening of the relevant data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the change in NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the proposed development. The significance of predicted impacts can then be determined in accordance with the methodology outlined in the IAQM and EPUK guidance[9].

In addition BMBC have developed an Air Quality and Emissions Good Practice Guidance document (November 2021)[10], this provides advice on determining the classification of the proposed development, assessing the impacts on local air quality and determining the level of mitigation required. It also contains additional traffic criteria (30 or more two way vehicle movements in any hour). This document has also been considered as part of the assessment.

3.2.1 Receptors

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

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[9] IAQM & EPUK (2017) Land-Use Planning & Development Control: Planning for Air Quality V1.2.

[10] Barnsley Metropolitan Borough Council (2021) https://www.barnsley.gov.uk/media/20122/pdc-2020-mar-bmbc-aqande-technical-planning-guidance-v13.pdf

Exceedances of 60µg/m^3 as an annual mean NO_2 concentration are used as an indicator of potential exceedances of the 1-hour mean NO_2 objective. Also exceedances of 32µg/m^3 as an annual mean PM_{10} concentration are used as an indicator of potential exceedances of the 24-hour mean PM_{10} objective.

LAQM.TG(16)[3] provides the following examples of where annual mean AQS objectives should apply:

- residential properties,
- schools,
- hospitals, and
- care homes.

These are all locations where sensitive subsets of the population could potentially be exposed to air pollutants over a long-term period.

4 Baseline

4.1 Local Air Quality Management

As required by the Environment Act (1995), BMBC has undertaken Review and Assessment[11] of air quality within their area of jurisdiction. This process has indicated that there are areas which exceed annual mean concentrations of NO_2. As such, six AQMAs have been declared by the council:

- AQMA 1 - M1 Motorway, 100 metres either side of the central reservation within the Barnsley Borough.
- AQMA 2A - A628 Dodworth Road;
- AQMA 4 - A61 Harborough Hill Road
- AQMA 5 - Junction of A633 Rotherham Road and Burton Road;
- AQMA 6 - A616 passing through Langsett;
- AQMA 7 - Junction of A61 Sheffield and A6133 Cemetery Road

AQMA 2A is located closest to the proposed development, approximately 600m to the west of the site, displayed in Figure 2.

Figure 2 - Proximity of site to Air Quality Management Areas

BMBC have concluded that concentrations of all other pollutants considered within the AQS are below the relevant objectives.

[11] Barnsley Metropolitan Borough Council (2021) Air Quality Annual Status Report 2021. https://www.barnsley.gov.uk/media/19969/asrtemplateengland2021v20-1-barnsley-mbc.pdf

4.2 Air Quality Monitoring

BMBC undertake monitor of air quality using three automatic monitoring stations and over 60 diffusion tube sites. The annual average NO_2 and PM_{10} concentrations monitored from 2016 to 2020 for this site are summarised in Table 3 and 4. It should be noted that monitoring results from 2020 were influenced by COVID-19 and associated lockdown measures and are not considered representative of a typical year scenario.

Table 3 - Automatic Monitoring Concentrations

Site Name	Site Type	Pollutant Type	X	Y	Annual Average Concentrations (µg/m³)				
					2016	2017	2018	2019	2020
CM1	Roadside	PM_{10}	436298	405691	22	17	18	20	20
CM2	Roadside	NO_2	432680	406174	36	35	32	32	25
CM3	Urban Background	NO_2	432525	407475	19	19	16	17	12

Exceedances of the AQS objective are shown in bold

The monitored NO_2 and PM_{10} concentrations from all the automatic sites show that air pollutant concentrations are well below the AQS objectives.

The annual average monitoring data from diffusion tubes sites between 2016 to 2020 are summarised in Table 4.

Table 4 - Local NO_2 Diffusion Tube Concentrations

Site ID	X	Y	Site Type	Annual Average NO_2 Concentration (µg/m³)				
				2016	2017	2018	2019	2020
1	423621	399817	Roadside	37.1	35.9	29.5	29.3	18.1
2	421102	400496	Roadside	**41.5**	37.4	34.5	33.8	23.5
3	421143	400481	Roadside	**62.3**	**60.9**	**49.5**	**49**	31.2
4	421126	400485	Roadside	**63.9**	**57**	**48.2**	**48.8**	31.5
5	421291	400482	Roadside	39	39.5	31.8	31.9	21.1
6	421282	400471	Roadside	**47.6**	**45.1**	39.3	38.8	24.2
7	421117	400501	Roadside	33.1	32.7	28.5	28.3	18.6
8	421215	400475	Roadside	**68.7**	**65.4**	**55.7**	**55.6**	36.2
9	431468	408579	Kerbside	32.8	31.9	27.7	31.7	19.2
10	430820	409453	Urban Background	29.1	26.9	22.2	24.4	-
11	434000	406292	Roadside	**43.2**	38.5	35	39.1	26.5
12	433910	406290	Roadside	**45.5**	**41.8**	38.9	38.9	25.3
13	433820	406278	Roadside	**45.1**	**43.9**	39	**43.3**	29.3

Site ID	X	Y	Site Type	Annual Average NO_2 Concentration ($\mu g/m^3$)				
				2016	2017	2018	2019	2020
14	432702	406160	Roadside	**49.2**	**44.4**	39.4	**40.5**	26.6
15, 16, 17	432680	406174	Roadside	37.8	32.6	33.6	31.9	24.6
18	432603	406312	Roadside	36.9	34.1	27.6	30.3	16.2
19	432481	406068	Roadside	28.1	28.7	25.7	27.2	18.1
20	432535	406071	Roadside	**43.4**	**40.9**	37	39.6	29.3
21	432402	406013	Roadside	**51.1**	**49.1**	**45.8**	**46.2**	29.5
22	432351	405985	Kerbside	**52.7**	**50**	**44.2**	**48.1**	32.6
23	432281	405951	Roadside	**50**	**52**	**43.4**	**47**	28.9
24	435274	400384	Kerbside	32.5	40	30.2	30.3	20.6
25	434832	400405	Roadside	**42.9**	**40.2**	34.3	38.6	26
26	434820	400421	Roadside	**44.8**	**43.2**	**40.1**	**40.3**	25.7
27	434823	400398	Roadside	39.5	38.6	39.1	39.8	23.9
28	434652	400231	Roadside	25.5	22.6	23.9	23.6	15.1
29	434721	400352	Urban Background	31.3	32.1	27.6	28.3	17.8
30	434309	401032	Roadside	32.6	36.2	29.5	33.4	20.1
31	434595	401107	Roadside	33.2	31.8	29.7	29.7	19.1
32	434559	401274	Roadside	37.9	38.5	32.8	35.5	23
33	434251	406199	Roadside	31.8	30.9	29	31.2	18.7
34	435011	408281	Roadside	34.9	35.2	33.1	32.2	21.6
35	435027	408190	Roadside	**40.7**	38.7	37.4	35.9	25.7
36	435027	408104	Roadside	**42.9**	**43.4**	**40.1**	**40.3**	27.4
37	435174	407499	Roadside	34.3	33.4	30.2	32.3	21
38	434757	406995	Kerbside	**41.9**	**43.4**	**40.4**	37.8	24.7
39	436072	407320	Kerbside	**46.4**	**45.0**	**44.4**	41.9	28.9
40	437122	406557	Roadside	-	-	-	42.2	30
41	434933	406695	Roadside	69.1	68.7	59.3	60.3	42.4
42	434727	406753	Roadside	34	33.6	31.4	28.1	21.9
43	434955	406769	Roadside	**66.5**	**65.8**	**59.7**	**58.9**	**41.4**

Site ID	X	Y	Site Type	Annual Average NO_2 Concentration (µg/m^3)				
				2016	2017	2018	2019	2020
44	435049	407047	Roadside	**41.1**	**42.6**	37.2	39.1	27.4
45	445699	402140	Urban Background	24.1	24.8	21.7	22.6	-
46	437554	405291	Kerbside	**46.7**	**48.1**	**38.4**	**42.2**	29
47	434958	405672	Roadside	39	38.6	30.3	33.5	22.5
48	434964	405709	Roadside	**54.7**	**48.4**	**43.4**	**47.4**	32.1
49	437528	405675	Kerbside	**48.7**	**46.4**	39	**41.9**	30.2
50	435062	408244	Roadside	-	-	-	37.4	25
51	435049	408229	Roadside	-	-	-	31.0	20.4
52	434112	409625	Roadside	-	-	-	35.4	24.3
53	434809	406023	Roadside	-	-	-	**59.0**	38.6
54	421053	400489	Roadside	-	-	-	-	24.1
55	437369	405456	Roadside	-	-	-	**42.6**	27
56	420982	400495	Roadside	-	-	-	-	25.9
57	437242	405772	Roadside	-	-	-	38.9	29.1
58	437250	405813	Roadside	-	-	-	37.4	26.1
BU1	436069	407321	Roadside	-	30.3	33.9	36.3	25.6
BU2	436072	407320	Kerbside	-	33.9	38.8	**44.1**	29.2
BU3	436072	407320	Kerbside	-	35.2	**40.3**	**44.4**	29.4
BU4	436107	407307	Kerbside	-	39.4	33.9	**41.6**	27.1
BU5	436107	407307	Kerbside	-	36.8	34.7	38.7	26.9
BU6	436107	407307	Kerbside	-	**40.3**	37.2	39.8	27.7

Exceedances of the AQS objective are shown in bold

The closest diffusion tube site to the proposed development site is tube ID 42 which is located on Eldon Street. Review of the monitoring data available indicates that air pollutant concentrations at the proposed development site are below AQS objectives.

4.3 Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by Defra for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed site is

located within grid square 343500, 406500. Background pollutant data was downloaded from the Defra website[12] for the purpose of this assessment and is summarised in Table 5.**Table 5**

Table 5 - Defra Background Pollutant Concentrations

Pollutant	2022 Predicted Background Concentration (µg/m^3)
NO_2	15.2
PM_{10}	11.3
$PM_{2.5}$	7.3

As indicated in Table 5, background concentrations are below the relevant AQS objectives at the site.

[12] Defra (2022) UK Air Website https://uk-air.defra.gov.uk/data/laqm-background-home.

5 Assessment of Potential Effects

5.1 Operational Phase

The current use of the site is mainly car parking, as part of the development this will be replaced with a multistorey car park, residential properties and an Active Travel Hub. A transport assessment has been completed for the site which has indicated that the change in trips would be as a result of the residential units as the current car park usage would be accommodated in the reduced spaces in the multistorey car park. The total number of trips generated from the residential is around 68 movements on average a day. This is below the IAQM criteria of 100 AADT and the hourly criteria of 30 two-way vehicles within the BMBC Air Quality Planning Guidance. The development would therefore be classed as medium due to the number of proposed residential developments being proposed which are greater than 50 units, based on the BMBC Air Quality Planning Guidance.

The proposed residential units are located well away from major roads, the nearest road being Eldon Street North. There is a BMBC diffusion tube located on that road and the results of the monitoring are presented in Table 6.

Table 6 – Diffusion tube concentration recorded at nearest monitoring location to proposed site

Site ID	X	Y	Site Type	Annual Average NO_2 Concentration ($\mu g/m^3$)				
				2016	2017	2018	2019	2020
42	434727	406753	Roadside	34.0	33.6	31.4	28.1	21.9

As can be seen concentration is this area are well below the AQS Objective for annual mean NO_2 and are therefore unlikely to be in exceedance on the proposed development.

Given that the number of trips generated by the development is below the traffic change criteria in IAQM and BMBC Air Quality Planning Guidance no assessment of changes in emissions are required.

5.2 Construction Phase

A construction dust risk assessment has been undertaken in accordance with IAQM construction dust guidance[8] and is detailed in Appendix 1. The outcome of the dust risk assessment determined the proposed development is a medium risk site. Relevant mitigation measures have been proposed in accordance with the IAQM construction dust guidance and are presented in Table A13 in Appendix 1. Assuming the relevant mitigation measures outlined in Table A13 are implemented, the residual effect from all dust generating activities is predicted to be negligible.

6 Summary

Arcadis was instructed to prepare an air quality assessment for the proposed SEAM Phase 1 development.

The site is located close to an AQMA declared for exceedances of the annual average NO_2 AQS objective, however baseline data in the vicinity of the proposed development site indicates that NO_2 concentrations are well below AQS objective concentrations. Therefore, the site is considered suitable for the intended use of the proposed development in terms of air quality exposure.

Both construction and operational traffic flows to and from the site are expected to be below the IAQM development control screening criteria and BMBC criteria for undertaking a detailed assessment. Therefore, air quality impacts associated with the development in terms of traffic emissions is considered to be negligible.

A construction dust risk assessment was undertaken in accordance with the IAQM construction dust guidance. The risk of dust impacts during the construction phase was evaluated by assessing the dust emissions magnitude of the planned construction activities and by taking into account the existing sensitivity of area. It was concluded that there would be a medium risk of dust impacts from the construction phase of the proposed development if left unmitigated. However, with the application of the relevant mitigation measures proposed, it is concluded that the residual effect would be negligible.

A travel plan has been developed to accompany the application, in addition the development will comply with the councils adopted Sustainable Travel Supplementary Planning Document in relation to the requirements for electric vehicle charging points.

Appendix A: Construction Dust Assessment

Construction Dust Assessment Methodology

In order to determine appropriate mitigation measures and a suitable monitoring programme, a dust risk assessment has been undertaken in accordance with the methodology outlined within the IAQM 'Guidance on the Assessment of Dust from Demolition and Construction'[8].

The assessment steps are detailed below:

Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m of the boundary or 50m from the construction vehicle route (up to 500m from the Site entrance for large sites, 200m from medium sites and 50m from small sites), then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the Site or 50m from the construction vehicle route (up to 500m from the Site entrance for large sites, 200m from medium sites and 50m from small sites), then the assessment also proceeds to Step 2.

Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table A1.

Table A1 - Construction Dust: Magnitude of Emission[8]

Magnitude	Activity	Criteria
Large	Demolition	Total building volume greater than 50,000m^3 Potentially dusty construction material (e.g. concrete) On-site crushing and screening Demolition activities greater than 20m above ground level
	Earthworks	Total site area greater than 10,000m^2 Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) More than 10 heavy earth moving vehicles active at any one time Formation of bunds greater than 8m in height More than 100,000 tonnes of material moved
	Construction	Total building volume greater than 100,000m^3 On site concrete batching

		Sandblasting
	Trackout	More than 50 Heavy Duty Vehicle (HDV) trips per day Potentially dusty surface material (e.g. high clay content) Unpaved road length greater than 100m
Medium	Demolition	Total building volume 20,000m3 to 50,000m^3 Potentially dusty construction material Demolition activities 10m to 20m above ground level
	Earthworks	Total site area 2,500m2 to 10,000m^2 Moderately dusty soil type (e.g. silt) 5 to 10 heavy earth moving vehicles active at any one time Formation of bunds 4m to 8m in height Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	Total building volume 25,000m^3 to 100,000m^3 Potentially dusty construction material (e.g. concrete) On site concrete batching
	Trackout	10 to 50 HDV trips per day Moderately dusty surface material (e.g. high clay content) Unpaved road length 50m to 100m
Small	Demolition	Total building volume under 20,000m^3 Construction material with low potential for dust release (e.g. metal cladding or timber) Demolition activities less than 10m above ground level. Demolition activities during wetter months
	Earthworks	Total site area less than 2,500m^2 Soil type with large grain size (e.g. sand) Less than 5 heavy earth moving vehicles active at any one time Formation of bunds less than 4m in height Total material moved less than 20,000 tonnes Earthworks during wetter months
	Construction	Total building volume less than 25,000m^3 Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	Less than 10 HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table A2.

Table A2 - Construction Dust: Examples of Factors Defining Sensitivity of an Area[8]

Receptor Sensitivity	Examples	
	Human Receptors	**Ecological Receptors**
High	Users expect of high levels of amenity High aesthetic or value property People expected to be present continuously for extended periods of time Locations where members of the public are exposed over a time period relevant to the objective for PM_{10}. e.g. residential properties, hospitals, schools and residential care homes	Internationally or nationally designated site e.g. Special Area of Conservation
Medium	Users would expect to enjoy a reasonable level of amenity Aesthetics or value of their property could be diminished by soiling People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	Nationally designated site e.g. Sites of Special Scientific Interest
Low	Enjoyment of amenity would not reasonably be expected Property would not be expected to be diminished in appearance Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads	Locally designated site e.g. Local Nature Reserve

The IAQM construction dust guidance[8] also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts:

- Any history of dust-generating activities in the area;
- The likelihood of concurrent dust-generating activity on nearby sites;
- Any pre-existing screening between the source and receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

These factors have been considered during the undertaking of the assessment.

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table A3.

Table A3 - Construction Dust: Sensitivity of the Area to Dust Soiling Effects on People and Property[8]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Note – only the highest level of sensitivity needs to be considered.

Table A4 outlines the criteria for determining the sensitivity of the area to human health impacts.

Table A4 - Construction Dust: Sensitivity of the Area to Human Health Impacts[8]

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	Greater than 32µg/m^3	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32µg/m^3	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28µg/m^3	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	Greater than 32µg/m^3	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
	28 - 32µg/m^3	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m3	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	Less than 24µg/m3	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

Note – only the highest level of sensitivity needs to be considered.

Table A5 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table A5 - Construction Dust: Sensitivity of the Area to Ecological Impacts[8]

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

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

Table A6 outlines the risk category from demolition activities.

Table A6 - Construction Dust: Dust Risk Category from Demolition Activities[8]

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Medium	Low	Negligible

Table A7 outlines the risk category from earthworks and construction activities.

Table A7 - Construction Dust: Dust Risk Category from Earthworks and Construction Activities[8]

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table A8 outlines the risk category from trackout activities.

Table A8 - Construction Dust: Dust Risk Category from Trackout Activities[8]

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Low	Negligible
Low	Low	Low	Negligible

Step 3

Step 3 requires the identification of site-specific mitigation measures within the guidance to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with negligible risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible, hence the residual effect will normally be not significant. This has been described as negligible within this report to provide continuity between assessment terminologies.

Construction Dust Risk Assessment

Step 1

The undertaking of activities such as demolition, excavation, ground works, cutting, construction and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from highway surfaces.

The potential for impacts at sensitive receptors depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

There are no designated ecological sites located within 50m of the site or trackout boundary. As such, impacts on ecological sites have not been assessed further within this report.

Step 2

Demolition

No demolition activities will occur at the site as part of the works. Therefore, consideration of the impacts of demolition are not required.

Earthworks

The total site area is between 2,500m^2 – 10,000m^2, with a potentially dusty soil type. Therefore, the magnitude of potential dust emissions from earthworks is classified as medium.

Construction

The total building volume to be constructed is estimated to be 25,000m^3 – 100,000m^3 with potentially dusty construction material. It is not yet known if on site concrete batching will be required. As such, the magnitude of potential dust emissions from construction is classified as medium.

Trackout

The maximum number of outward HDV movements during the construction phase of the proposed development is anticipated to be less than 10 per day. As such, the magnitude of potential dust emissions from trackout is classified as small.

The dust emission magnitude for each dust generating activity for the construction of the proposed development is summarised in Table A9.

Table A9 - Dust Emission Magnitude Summary

Activity	Dust emission magnitude
Demolition	N/A
Earthworks	Medium
Construction	Medium
Trackout	Small

Receptors sensitive to potential dust impacts during the construction phase include human receptors e.g. residential dwellings. The number of human receptors were approximated from a desktop study of the area up to 350m from the site boundary for earthworks and construction, and up to 50m from the road network within 500m of the site access for trackout. These are summarised in Table A10.

Table A10 - Approximate Number of Dust Sensitive Receptors

Distance from Site (m)	Approximate Number of Human Receptors
Less than 20	1-10
Less than 50	10-100
Less than 100	10-100

Distance from Site (m)	Approximate Number of Human Receptors
Less than 200	>100
Less than 350	>100
Distance from Trackout Study Area (m)	
Less than 20	1-10
Less than 50	1-10

In accordance with the IAQM construction dust guidance, the highest level of sensitivity should be recorded from the criteria outlined in guidance[8]. Therefore, the receptor sensitivity to determine sensitivity of the area to dust soiling effects and human health impacts is considered to be high. This is because users would expect to enjoy a reasonable level of amenity, aesthetics or value of their property could be diminished by soiling and people would be expected to be present for extended periods of time e.g. residential properties (refer to Table A2).

In order to determine the sensitivity of the receiving environment, the average PM_{10} background concentration for the site was obtained from the Defra website[13] and identified as being 11.3µg/m^3 for 2022 Therefore, in accordance with the IAQM guidance[8], health impacts should be determined based on the criteria within the less than 24µg/m^3 category (refer to Table A4).

The sensitivity of the receiving environment to specific dust impacts is summarised in Table A11. Note that the extent of earthworks and construction activities has been assumed up to the red line boundary of the proposed development site as a worst case scenario.

Table A11 - Summary of the Sensitivity of the Area

Potential Impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	N/A	Medium	Medium	Medium
Human health	N/A	Low	Low	Low

The risk of effects in the absence of environmental measures was then defined based upon the interaction between the magnitude of emission and the highest level of area sensitivity (determined in Steps 2A and 2B, respectively) for each dust generating activity. The risk of dust effects was determined, as presented in Table A12.

[13] Defra (2017) UK Air Website https://uk-air.defra.gov.uk/data/laqm-background-home.

Table A12 - Summary of the Risk of Dust Effects

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	N/A	Medium Risk	Medium Risk	Negligible
Human health	N/A	Low Risk	Low Risk	Negligible

As indicated in Table A12, the potential risk of dust soiling is medium for earthworks and construction and negligible for trackout. The potential risk of human health impacts is low for earthworks and construction and negligible for trackout. The assessment has therefore indicated that the maximum risk of dust effects is medium, as a worst case.

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase.

Step 3

The IAQM guidance on the assessment of dust from demolition and construction[8] provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the proposed development based on the risk of dust effects for each activity and for the overall site (Table A12) and are summarised in Table A13.

Table A13 - Proposed Dust Mitigation Measures based on IAQM Guidance[8]

Mitigation Measure	Medium Risk Measures H=Highly recommended D=Desirable
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	H
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.	H
Display the head or regional office contact information.	H
Dust Management	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	H

Mitigation Measure	Medium Risk Measures H=Highly recommended D=Desirable
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.	H
Make the complaints log available to the local authority when asked.	H
Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	H
Monitoring	
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.	D
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.	H
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.	H
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	H
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.	H
Erect solid screens or barriers around dusty activities or the site boundary so that are at least as high as any stockpiles on site.	H
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	H
Avoid site runoff of water or mud.	H
Keep site fencing, barriers and scaffolding clean using wet methods.	H

Mitigation Measure	Medium Risk Measures H=Highly recommended D=Desirable
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below.	H
Cover, seed or fence stockpiles to prevent wind whipping.	H
Operating vehicle/machinery and sustainable travel	
Ensure all vehicles switch off engines when stationary - no idling vehicles.	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H
Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required, these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where appropriate).	D
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	H
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	D
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.	H
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H
Use enclosed chutes and conveyors and covered skips.	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	H
Waste Management	
Avoid bonfires and burning of waste materials.	H

Mitigation Measure	Medium Risk Measures H=Highly recommended D=Desirable
Earthworks (Medium Risk)	
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	D
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	D
Only remove the cover in small areas during work and not all at once.	D
Construction (Medium Risk)	
Avoid scabbling (roughening of concrete surfaces) if possible.	D
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	H
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	D
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	D

Step 4

Assuming the relevant mitigation measures outlined in Table A13 are implemented, the residual effect from all dust generating activities is predicted to be negligible.

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