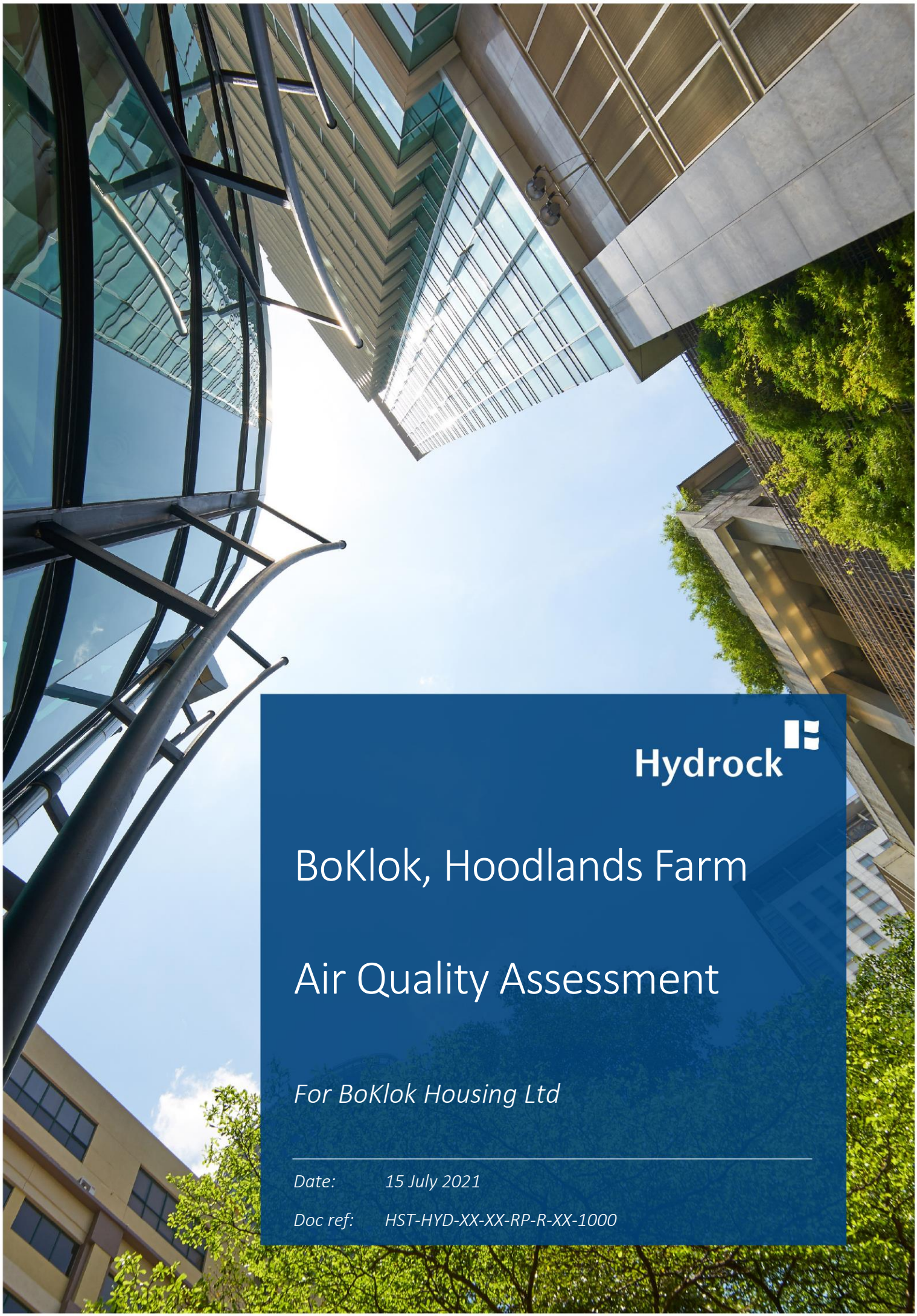

Hydrock

BoKlok, Hoodlands Farm

Air Quality Assessment

For BoKlok Housing Ltd

Date: *15 July 2021*

Doc ref: *HST-HYD-XX-XX-RP-R-XX-1000*

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1. INTRODUCTION

Hydrock have been commissioned by BoKlok Housing Ltd to prepare an Air Quality Assessment (AQA) for the proposed residential development ("the Development") of 50 dwellings, with associated car parking and public open space at Hoodlands Farm, north of Hambrook Lane ("the Site"), situated within the boundary of South Gloucestershire Council (SGC), for planning purposes. The Site is centred on grid reference 363569, 179467 and is shown below in Figure 1:

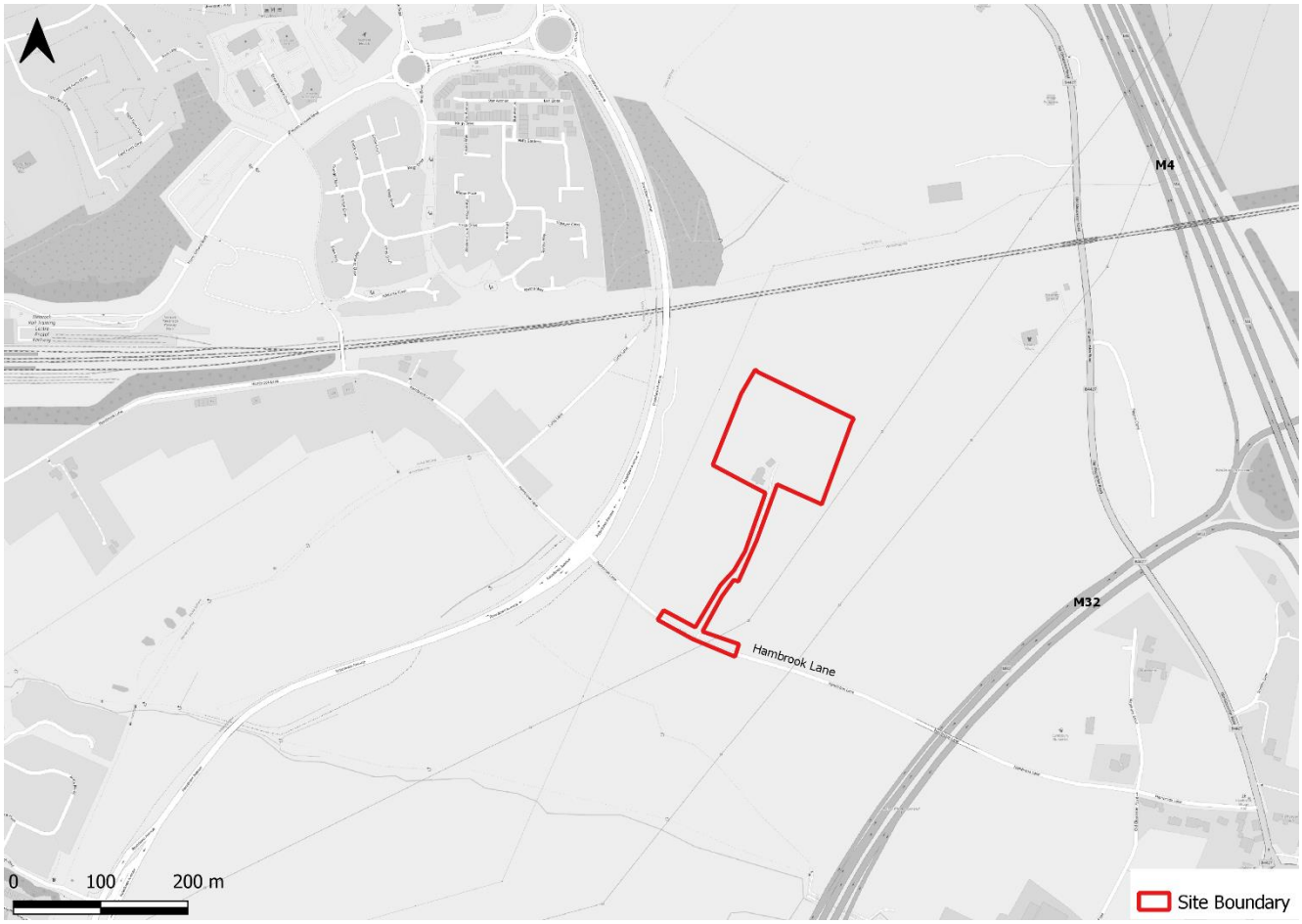

Figure 1 - Site Location

The Site is located on the north-eastern outskirts of Bristol and has a suburban / rural character, with open fields in the immediate vicinity. Approximately 80m to the north of the Site is the South Wales Main Line (GWR) railway line. The M4 Motorway is approximately 500m to the east, with the M32 approximately 270m south east of the Site. The Stoke Gifford Bypass lies approximately 80m west of the Site. The Development is within the East of Harry Stoke New Neighbourhood (EoHSNN) allocation, an area where other significant development is progressing.

Tailpipe emissions from vehicles travelling along the nearby roads are considered to be the main pollution source in the study area. There are no significant point sources in close proximity to the area, according to data from the National Atmospheric Emissions Inventory (NAEI)[1].

[1] Defra and BEIS, "Emissions from Point Sources as Calculated for the 2018 NAEI Maps," 2018, https://naei.beis.gov.uk/mapping/mapping_2018/NAEIPointsSources_2018.xlsx.

1.1 Purpose of Air Quality Assessment

This report provides a review of baseline air quality in the study area to assess the risk of exceedance of National Air Quality Objectives (NAQOs) at the Site and surrounding area, in order to consider its suitability for residential use, in air quality terms.

The potential impact of construction dust has also been assessed to conclude on the requirements for mitigation to reduce the significance of impacts to negligible during this phase.

2. RELEVANT LEGISLATION

2.1 EU

Whilst the UK has left the EU, the overarching EU directives relating to air quality still apply. The governing European Union Directive on ambient air quality and cleaner air for Europe (2008/50/EC)[2] came into force in 2008, and provides statutory guidance on air quality. This presents statutory requirements for the protection of human health and ecosystems through long and short-term limit values for: oxides of nitrogen (NO_x), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), particulate matter with a diameter of less than 10 microns (PM_{10}), particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$) carbon monoxide (CO), lead, benzene and ozone (O_3). The above legislation replaces the EU's previous three daughter directives.

2.2 UK

The targets and limit values set within the 2008/50/EC directive were transposed into UK law through the Air Quality Standards Regulations 2010, as amended[3]. These set out how the government has interpreted the EU directives noted above. One of the main additions is the regulatory framework for $PM_{2.5}$.

The Air Quality Strategy 2007 Volume 1[4] outlines the National Air Quality Standard (AQS) concentrations and NAQOs that should be achieved. A summary of the AQS concentrations and NAQOs of relevance to this assessment is provided below, in Table 1:

Table 1 - UK Air Quality Standards

Pollutant	Units	Averaging Period	Air Quality Standard (AQS)	National Air Quality Objectives (NAQO)
Nitrogen dioxide (NO_2)	µg/m³	1 Hour Mean	200 µg/m³	Not to be exceeded more than 18 times in a year.
		Annual Mean	40 µg/m³	
Particulate matter (PM_{10})	µg/m³	24 Hour Mean	50 µg/m³	Not to be exceeded more than 35 times in a year.
		Annual Mean	40 µg/m³	
Particulate matter ($PM_{2.5}$)	µg/m³	Annual Mean	25 µg/m³	25 µg/m³

Defra's Local Air Quality management Technical Guidance 2016 (LAQM.TG(16))[5] provides guidance on where the above NAQO's should apply. This is summarised below, in Table 2:

[2] EC, "Directive 2008/50/EC of the European Parliament and of the Council," May 21, 2008, 44.
[3] Parliament, "The Air Quality Standards Regulations 2010," June 11, 2010, http://www.legislation.gov.uk/uksi/2010/1001/pdfs/uksi_20101001_en.pdf.
[4] Defra, "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Volume 1" (Department for Food, Environment and Rural Affairs (Defra), July 2007), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf.
[5] Defra, "LAQM Technical Guidance LAQM.TG16" (Department for Food, Environment and Rural Affairs (Defra), February 2018), https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf.

Table 2 - Summary of where NAQOs should apply:

Averaging Period	Objectives should apply at:	Objectives should generally NOT apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to other locations at the building façade) or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to other 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 and 8-hour mean objectives apply. Kerbside site (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railways stations etc. which are not fully enclosed, where members of the public might be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where member of the public might reasonably be exposed for a period of 15 minutes	

From the above, it can be concluded that both the annual mean and short term mean NAQOs apply at the residential properties when considering both the exposure of new receptors at the Site and at existing high-sensitivity receptors such as residential dwellings, schools and hospitals, when considering the impact of the scheme on local air quality.

2.3 Local Air Quality Management

Obligations under the Environment Act 1995[6] require local authorities to declare an Air Quality Management Area (AQMA) at sensitive receptor locations where an objective concentration has been predicted to be exceeded. In setting an AQMA, the local authority must then formulate an Air Quality Action Plan (AQAP) to seek to reduce pollution concentrations to values below NAQOs.

SGC currently have two AQMAs; the Kingswood - Warmley AQMA and the Staple Hill AQMA, both declared for exceedances of the NO_2 annual mean NAQO. The closest of these AQMAs is the Staple Hill AQMA located approximately 3km to the south east. The other previously declared AQMAs in the SGC area have both since been revoked. These were the M4, M5, M32 and M49 Motorways Corridor AQMA, revoked in March 2004, and the Cribbs Causeway AQMA, more recently revoked in July 2020.

[6] Environment Agency, "Environment Act 1995" (The Environment Agency, 2002), http://www.legislation.gov.uk/ukpga/1995/25/contents.

The Bristol City Council (BCC) AQMA, declared for exceedances of the PM_{10} 24-Hour Mean and the NO_2 1-hour and Annual Mean NAQOs, is the closest AQMA to the Development located approximately 1.5km to the south. The location of the Development in relation to the AQMAs is shown below in Figure 2:

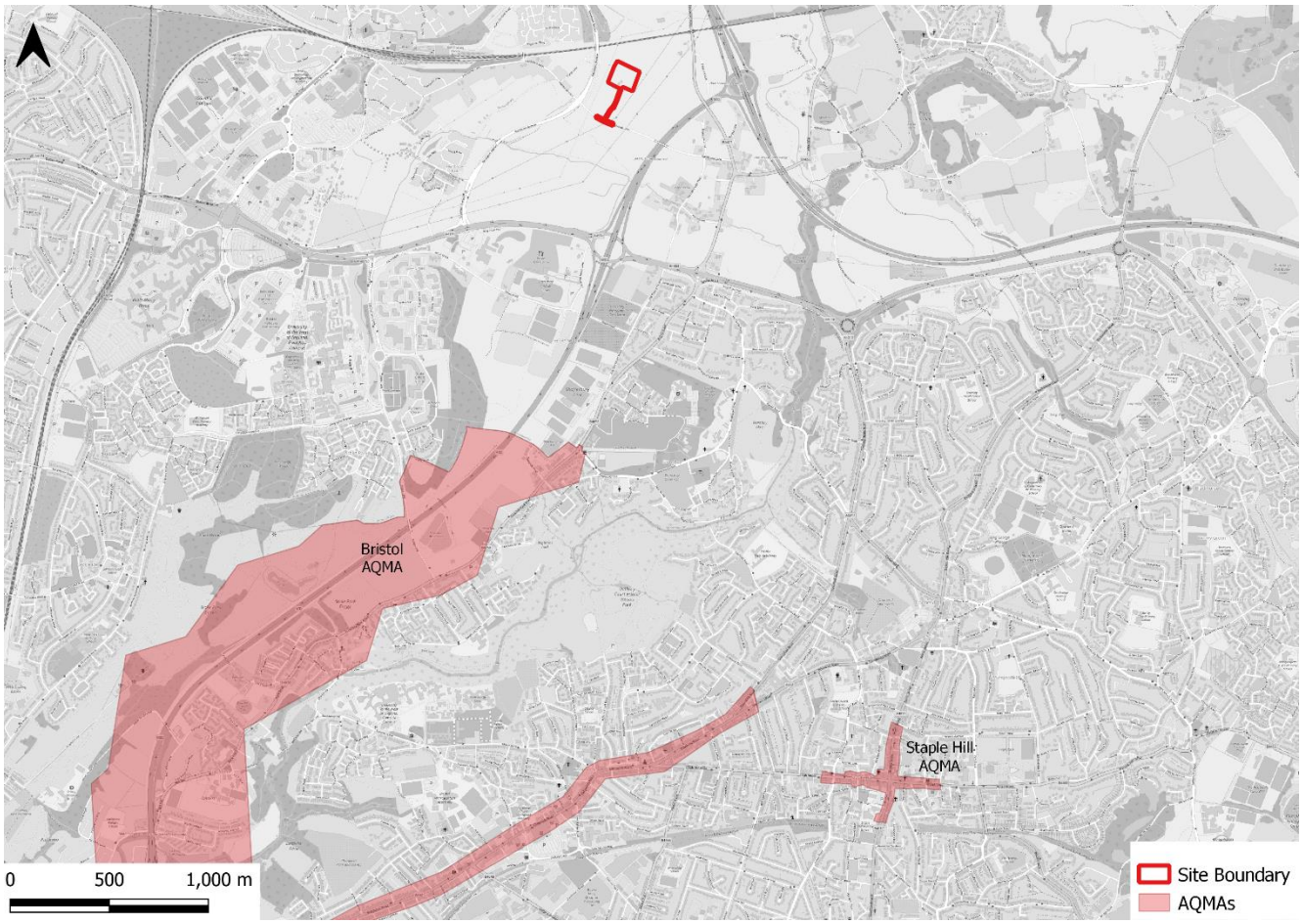

Figure 2 - Air Quality Management Areas

In response to the declaration of the AQMAs, SGC published their AQAP for Kingswood and Staple Hill in 2012[7]. This contains the measures aimed at achieving compliance within the AQMAs, including measures such as reducing congestion through the AQMAs to improve air quality. As well as SGC's AQAP, the West of England Joint Local Transport Plan 4 (JLTP4)[8] contains measures that will help address air quality issues, such as aiming to provide more public transport options and improve service quality. Achieving the aims of the JLTP4 will have air quality benefits.

Bristol City Council are also required to publish an AQAP in response to the declaration of Bristol AQMA. This AQAP is contained within the JLTP4. The Clean Air Zone Plans in Bristol[9] will also help achieve compliance with the NAQOs in central Bristol. The current plans for a clean zone in Bristol show this is located over 6.5km to the south west, in Bristol City Centre.

[7] South Gloucestershire Councill, "Air Quality Action Plan: Kingswood and Staple Hill," March 2012, https://www.southglos.gov.uk/documents/cos120094.pdf.
[8] West of England Partnership, "The Joint Local Transport Plan (JLTP) 4, 2020 -2036," n.d., https://s3-eu-west-1.amazonaws.com/travelwest/wp-content/uploads/2020/04/Adopted-Joint-Local-Transport-Plan-4.pdf.
[9] Bristol City Council, "Clean Air For Bristol," 2020, https://www.cleanairforbristol.org/#intro.

2.4 UK Air Quality Action Plan for NO_2

The UK Air Quality Plan for Nitrogen Dioxide was published in 2017[10]. This requires local authorities that are likely to exceed the EU Limit Value of 40 µg/m^3 NO_2 beyond 2020, to reach compliance with this limit in the 'shortest possible time'. This national assessment identified the A4174 ring road between the M32 Junction 1 and the Bromley Heath roundabouts as being above the annual mean limit value for NO_2 of 40 µg/m^3. South Gloucestershire Borough Council's local modelling confirmed that this link was projected to become compliant in 2021. The location of this non-compliant link in relation to the Development is shown below in Figure 3:

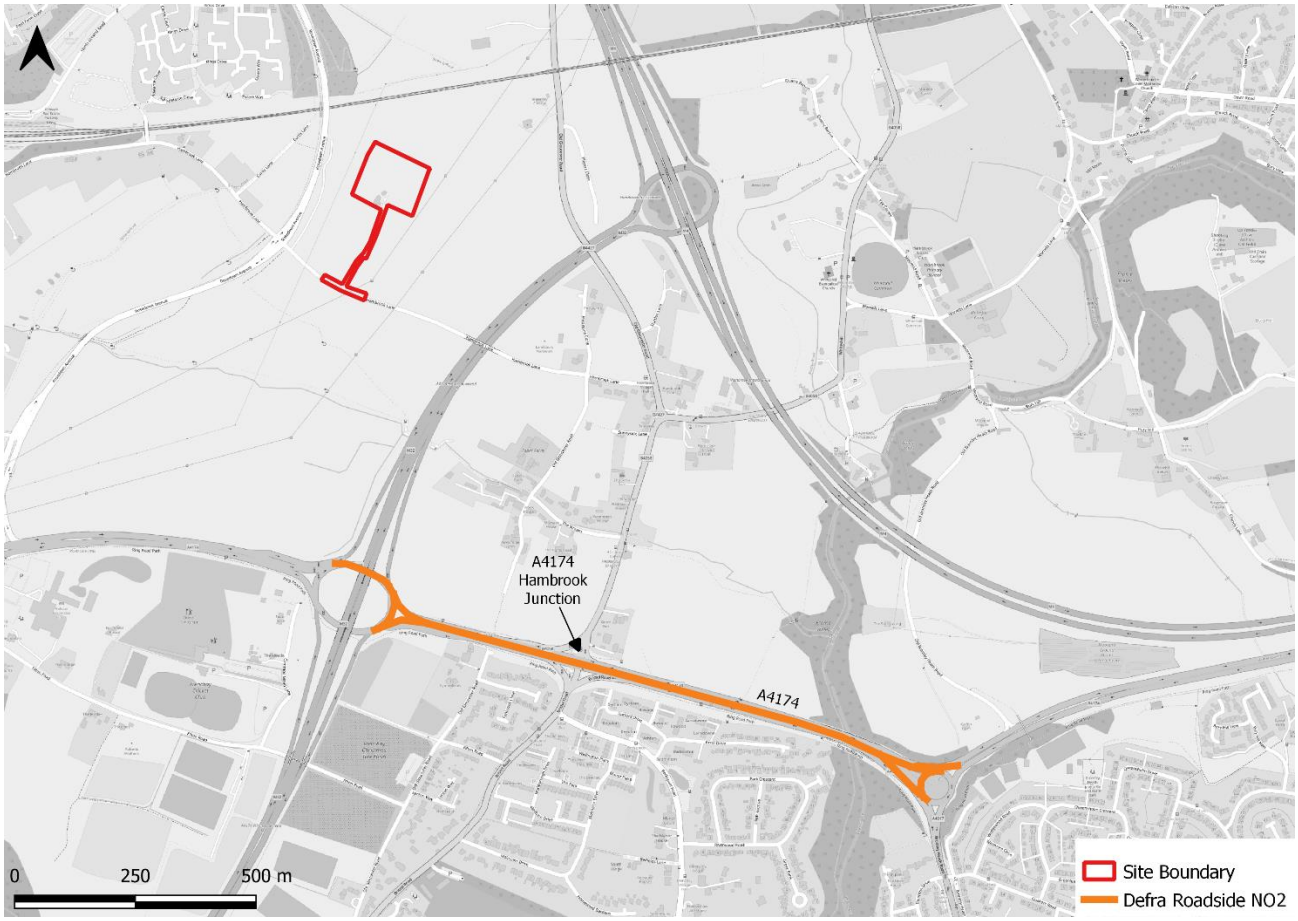

Figure 3 – Defra Roadside NO_2 non-compliant Road Link

SGC were required by government to assess if there were any actions that could be taken to reduce the high NO_2 levels on this section of the ring road to meet the legal limits in the shortest time possible. A SGC feasibility study identified that traffic management measures were expected to bring forward compliance from 2021 to 2019[11]. These traffic measures were implemented in August 2019 through an Experimental Traffic Order (ETO)[12], which involved changes to the traffic signalisation and routing at Hambrook traffic lights, with the aim of reducing idling time.

[10] Defra, "Defra (Revised 2018) Air Quality Plan for Nitrogen Dioxide (NO2) in UK (2017).," 2017, https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017.
[11] SGC, "South Gloucestershire Council – Targeted Feasibility Study To Deliver Nitrogen Dioxide Concentration Compliance In The Shortest Possible Time", n.d., https://uk-air.defra.gov.uk/library/assets/documents/no2ten/South_Gloucestershire_FINAL.pdf
[12] SGC, "SGC Website, Hambrook lights – changes to traffic movements", https://beta.southglos.gov.uk/hambrook-lights-changes-to-traffic-movements/

2.5 National Planning Policy Framework

The National Planning Policy Framework (nPPF)[13] sets out the Government's planning policy for England. It requires planning decisions for any new development to prevent new and existing development from contributing to, or being put at risk from, unacceptable levels of air pollution (paragraph 170). It also states that planning decisions should sustain and contribute towards compliance with relevant limit values or national objectives for air pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones (paragraph 181), and the cumulative impacts from other sites (paragraph 180).

Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. Furthermore, planning decisions should ensure that any new development in AQMAs and Clean Air Zones (CAZs) is consistent with the local air quality action plan.

2.6 Planning Practice Guidance

Reference ID 32 (Air Quality) of the National Planning Practice Guidance (nPPG)[14] which was updated in November 2019, provides guiding principles on how planning can take account of the impact of new development on air quality. The PPG summarises the importance of air quality in planning and the key legislation relating to it.

2.7 Local planning policy

Locally, air quality is considered within SGC's Local Plan Policies, Sites and Places Plan (adopted November 2017)[15]. This document forms part of the local plan alongside the Core Strategy[16]. Within the Policies, Sites and Places Plan, Policy PSP21 – Environmental Pollution and Impacts states:

> *"POLICY PSP21 – ENVIRONMENTAL POLLUTION AND IMPACTS*
>
> *Development proposals will be acceptable where they clearly demonstrate that development is sited and designed to prevent unacceptable risks and avoid unacceptable levels of pollution adversely impacting, by way of; fumes, dust, noise, vibration, odour, light or other forms of air, land, water pollution, exposure to contaminated land or land instability, directly or cumulatively, on:*
>
> *• environmental amenity; and*
>
> *• the health, safety and amenity of users of the site or the surrounding area.*
>
> *Account will be taken of:*
>
> *• The impact of existing sources of noise or other pollution on the new development; and*
>
> *• The impact of the new development on existing uses by reason of its sensitivity to noise or other pollution.*
>
> *…*

[13] Ministry of Housing, Communities and Local Government, "National Planning Policy Framework," February 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf.
[14] Ministry of Housing, Communities & Local Government, "Reference ID (32) Air Quality" (Ministry of Housing, Communities & Local Government, 2019), https://www.gov.uk/guidance/air-quality--3.
[15] South Gloucestershire Councill, "South Gloucestershire Local Plan: Policies, Sites and Places," November 2017.
[16] South Gloucestershire Councill, "South Gloucestershire Local Plan: Core Strategy 2006 - 2027," December 2013, https://beta.southglos.gov.uk/wp-content/uploads/South-Gloucestershire-Core-Strategy-2006-2027.pdf.

Air Quality

Development that, on its own or cumulatively, has the potential for significant emissions to the detriment of air quality, particularly in or adjacent to air quality management areas, will be acceptable where potential adverse effects are mitigated to an acceptable level, by an appropriate scheme of mitigation. Development that would introduce new receptors into designated air quality management areas and other potential areas of poor air quality, should take account of existing air pollution and include measures to mitigate the impact on future receptors to an acceptable level. Development outside Air Quality Management Areas (AQMAs) should not cause new AQMAs to be designated."

3. METHODOLOGY

3.1 Consultation

Full details of the air quality assessment methodology were first sent via email to SGC's Air Quality Officers in May, 2021 with a request for further comment / guidance. This was followed up with a phone call regarding the methodology.

A written response from the EHO was received in June 2021, as follows:

> *"…Please also note that the Cribbs Causeway AQMA adjacent to M5 J17 was revoked in July 2020.*
>
> *I confirm that your proposed methodology detailed in your email of 13 May below is acceptable based on the information provided. This information should be included in the assessment to justify your approach, along with your understanding regarding the cumulative impacts of traffic from other committed major development in the vicinity as discussed.*
>
> *Thank you also for confirming you will review and reference the Defra LAQM Covid-19 supplementary guidance in your report as appropriate, and for providing details on the expected phasing/completion of the site. During our phone conversation, you also mentioned that the Energy Statement indicated Air Source Heat pumps were to be installed in the proposed dwellings which is welcome.*
>
> *Finally, please consider the following good practice principle identified in the "Land-Use Planning & Development Control: Planning for Air Quality" guidance produced by Environmental Protection UK (EPUK) /Institute of Air Quality Management (IAQM) (January 2017) which should be applied to **all** development to reduce emissions and contribute to better air quality management:*
>
> *Where on-site parking is provided for residential dwellings, Electric Vehicle (EV) charging points for each parking space should be provided."*

It was confirmed that a 'simple' assessment of the Development would be acceptable given the scale of the scheme, and that cumulative impacts could be judged sufficiently through review of the Approved East of Harry Stoke Outline Application (planning reference: PT16/4782/O) Environmental statement (ES).

The agreed methodology is outlined below.

3.2 Guidance

Defra's LAQM.TG (16)[5] and the EPUK & IAQM Land-use Planning & Development Control: Planning for Air Quality[17] have been followed as guidance to produce this assessment. The IAQM's guidance on assessing impacts from construction[18] has been followed for the construction assessment.

Defra's Covid-19: Supplementary Guidance for Local Air Quality Management Reporting in 2021[19] has also been considered accordingly in the report.

[17] IAQM, "Land-Use Planning & Development Control: Planning for Air Quality" (Institute for Air Quality Management (IAQM), January 2017), http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.
[18] IAQM, "Guidance on the Assessment of Dust from Demolition and Construction" (Institute of Air Quality Management (IAQM)), February 2014), http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.
[19] Defra and the GLA, "COVID-19: SUPPLEMENTARY GUIDANCE Local Air Quality Management Reporting in 2021", 2021.

3.3 Baseline Air Quality

The baseline air quality conditions in the vicinity of the Development have been established through the compilation and review of appropriately sourced background concentration predictions and local monitoring data. Data sources for this include:

- Data from the National Atmospheric Emissions Inventory;
- Defra's modelled background concentrations of AQS pollutants (UK-AIR)[20]. These estimates are produced using detailed modelling tools and are available as concentrations at central 1km^2 National Grid square locations across the UK;
- Defra's modelled roadside concentrations of AQS pollutants (UK-AIR). These have been modelled as part of the UK Air Quality Plan for nitrogen dioxide (NO_2)[10] assessment using the Pollution Climate Mapping (PCM) model;
- SGC's latest available air quality monitoring data, derived from the latest available Annual Status Report 2019[21]. At the time of writing, these data were from 2018, and;
- SGC's EHO has also provided the bias adjusted 2019 data for local council monitoring sites.

3.4 Construction Dust Risk Assessment

A construction dust risk assessment is provided in section 5, which has been undertaken in line with IAQM guidance. This considers the risk of impacts during the construction phase in terms of nuisance dust, human health (PM_{10} exposure) and ecological impacts.

With regard to ecological receptors, risk assessment should be undertaken where high-sensitivity receptors are located within 50m of a site boundary. The Multi Agency Geographic Information for the Countryside (MAGIC) website, which incorporates Natural England's interactive maps[22], has been reviewed to identify whether any statutory ecological sensitive receptors are situated within 50m of the Site boundary or within 50m of any routes used by construction vehicles on the public highway, up to 500m from the Site entrance for Large sites, 200m for Medium sites and 50m for Small sites. No such receptors were identified and no further assessment is required in relation to ecological receptors.

Within distances of 20m of the Site boundary there is a high risk of dust impacts. Up to 100m from the construction site, there may still be a high risk, particularly if the receptor is downwind of the prevailing wind direction in relation to the dust source. It is considered that for receptors more than 350m from the Site boundary, the risk is negligible. Sensitive human receptors were identified within 350m of the Site boundary. Based on the IAQM guidance residential dwellings are considered as high sensitivity receptors in relation to both dust soiling and health effects of PM_{10}. Indicative examples of medium sensitivity receptors include places of work, such as offices.

The IAQM guidance states that the potential dust emission magnitude from Demolition, Earthworks, Construction and Trackout should all be assessed individually. In addition, the sensitivity of the area to adverse dust impacts should also be defined.

[20] UK-AIR, "Background Mapping Data for Local Authorities - 2018," n.d., https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.
[21] South Gloucestershire Councill, "2019 Air Quality Annual Status Report (ASR)," September 2019, https://www.southglos.gov.uk//documents/2019-SGBC-Air-Quality-Annual-Status-Report.pdf.
[22] Natural England and MAGIC partnership organisations., "Multi Agency Geographic Information for the Countryside.," 2020, https://magic.defra.gov.uk/MagicMap.aspx.

The overall significance of the risk of adverse impacts during the construction phase can then be defined using the 'risk of impacts matrix' for each stage of the construction phase described above.

3.5 Operational Assessment

3.5.1 Impact Assessment

The scope of assessment has been determined against the IAQM's checklist criteria. The IAQM guidance includes numerous criteria which are not directly relevant to the Development, such as those related to the realignment of roads within an AQMA, introduction of a new bus station, new road junctions and underground car parks. These have been excluded from this assessment and only relevant screening criteria have been included. The purpose of the checklist criteria shown in Table 3 is to establish whether a detailed assessment of potential impacts is required.

Table 3 - IAQM detailed assessment criteria

Criteria	The development will:	Indicative criteria to proceed to a detailed AQA:
1	Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV - cars and small vans <3.5t gross vehicle weight)	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA -more than 500 AADT elsewhere.
2	Cause a significant change in Heavy Duty (HDV) flows on local roads with relevant receptors (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
7	Have one of more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. This includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	Typically, any combustion plant where the single or combined NO_x emission rate is less than 5mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situation where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emissions rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

With regard to screening criteria 1 and 2, the transport consultants for the scheme, JUBB, have stated that the Development is not expected to see an increase in road traffic that will exceed criteria 1 and 2 for non-AQMA areas. Development traffic flows through the closest AQMA, Bristol AQMA, have also been considered and are not expected to exceed criteria 1 and 2 for AQMA areas. Table 4 and Table 5 below presents the anticipated trip generation for the Development:

Table 4 - Traffic Generation from Scheme

Revised Scheme	Forecast AADT (2-Way Movements)	
	All Vehicles	HDV
Traffic Generation	238	3

Table 5 - Traffic Generation through Bristol AQMA

Bristol AQMA	Forecast AADT (2-Way Movements)	
	All Vehicles	HDV
Traffic Generation	43	1

With reference to screening criteria 7, the Development will utilize Air Source Heat Pumps (ASHPs) for heating and hot water. As such, the scheme will not introduce any new combustion sources, and criteria 7 is not triggered.

Based on the above, detailed assessment of air quality impacts has been scoped out, as it is reasonable to conclude that any potential impacts of this development would be insignificant, in air quality terms, in accordance with IAQM guidance.

3.5.2 Exposure Assessment

This section will consider the suitability of the Site for residential use in terms of air quality. The primary concern for the Development when considering the exposure of the new residents to poor air quality is the surrounding highway network and the railway line to the north. The exposure assessment has utilised the following tools:

- Defra's AEA 'Diffusion Tube for Ambient NO_2 Monitoring: Practical Guidance[23] to classify the Site as urban background;
- The Design Manual for Roads and Bridges LA 105: Air Quality[24];
- Defra's LAQM.TG(16) guidance[5], to consider the risk of exposure from the railway line; and
- Defra's Fall-Off with Distance Calculator[25].

[23] AEA Energy and Environment, "Diffusion Tubes for Ambient NO2 Monitoring: Practical Guidance," 2008, https://laqm.defra.gov.uk/documents/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf.
[24] Highways England, "Design Manual for Roads and Bridges LA 105: Air Quality," 2019, https://www.standardsforhighways.co.uk/prod/attachments/10191621-07df-44a3-892e-c1d5c7a28d90.
[25] Defra, "Nitrogen Dioxide Fall off with Distance Calculator.," n.d., https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html.

4. BASELINE AIR QUALITY CONDITIONS

Baseline air quality conditions in the study area are established through compilation and review of appropriately sourced monitoring and modelling data.

4.1 UK-AIR background concentrations

Defra provides estimated background concentrations of AQS pollutants at the UK-AIR website. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km^2 National Grid square locations across the UK. At the time of writing, the most recent background maps were from August 2020 and based on monitoring data from 2018.

Estimated background concentrations of the key AQS pollutants relevant to this assessment (at grid square 363500, 179500) are presented in Table 6 for NO_2, PM_{10} and $PM_{2.5}$.

Table 6 - UK-AIR background concentrations and NAQOs

Pollutant		Period	National Air Quality Objectives (NAQO)	Annual Mean					
				363500, 179500					
Description	Units			2018	2019	2020	2021	2022	2023
Nitrogen dioxide (NO_2)	µg/m^3	Annual mean	40	18.55	17.69	16.78	15.99	15.23	14.61
Particles (PM_{10})	µg/m^3	Annual mean	40	15.59	15.31	15.02	14.89	14.75	14.62
Particles ($PM_{2.5}$)	µg/m^3	Annual mean	25	9.99	9.79	9.58	9.47	9.37	9.26

The data shows that annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$ are well below the NAQOs in all years. In 2021, annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were modelled to be below the annual mean NAQOs by 60.0%, 62.8% and 62.1%, respectively.

Concentrations of all pollutants are predicted to decline incrementally each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles and strategies to reduce emissions across all sectors.

Note that the Covid-19 Supplementary Guidance[19] published by Defra states there may be a 'large' impact from the Covid-19 pandemic on the UK-AIR modelled projections:

> *"Activity and emissions data on which these are based will not have accounted for the impact of the COVID-19 in 2020 and beyond and so the resultant projected pollutant concentrations may not be reflective of actual pollution levels."*

However, as shown in Table 6, the 2019 projected levels of pollutants at the Site, which were not affected by the Covid-19 pandemic, are still well below the NAQOs.

4.2 Council Air Quality Monitoring Data

SGC monitored air quality at one continuous monitoring site in Yate and 105 non-continuous diffusion tube monitoring sites in 2018. SGC's EHO has also provided the 2019 data for the relevant diffusion tubes for the purpose of this AQA in advance of the 2020 ASR being published.

The continuous monitoring site is over 7km away from the Development and is therefore not representative of local conditions. As such, measurements at this monitoring site have not been reported. The data from diffusion tube sites within approximately 1km of the Development are reported in Table 7, with locations shown in Figure 4 below:

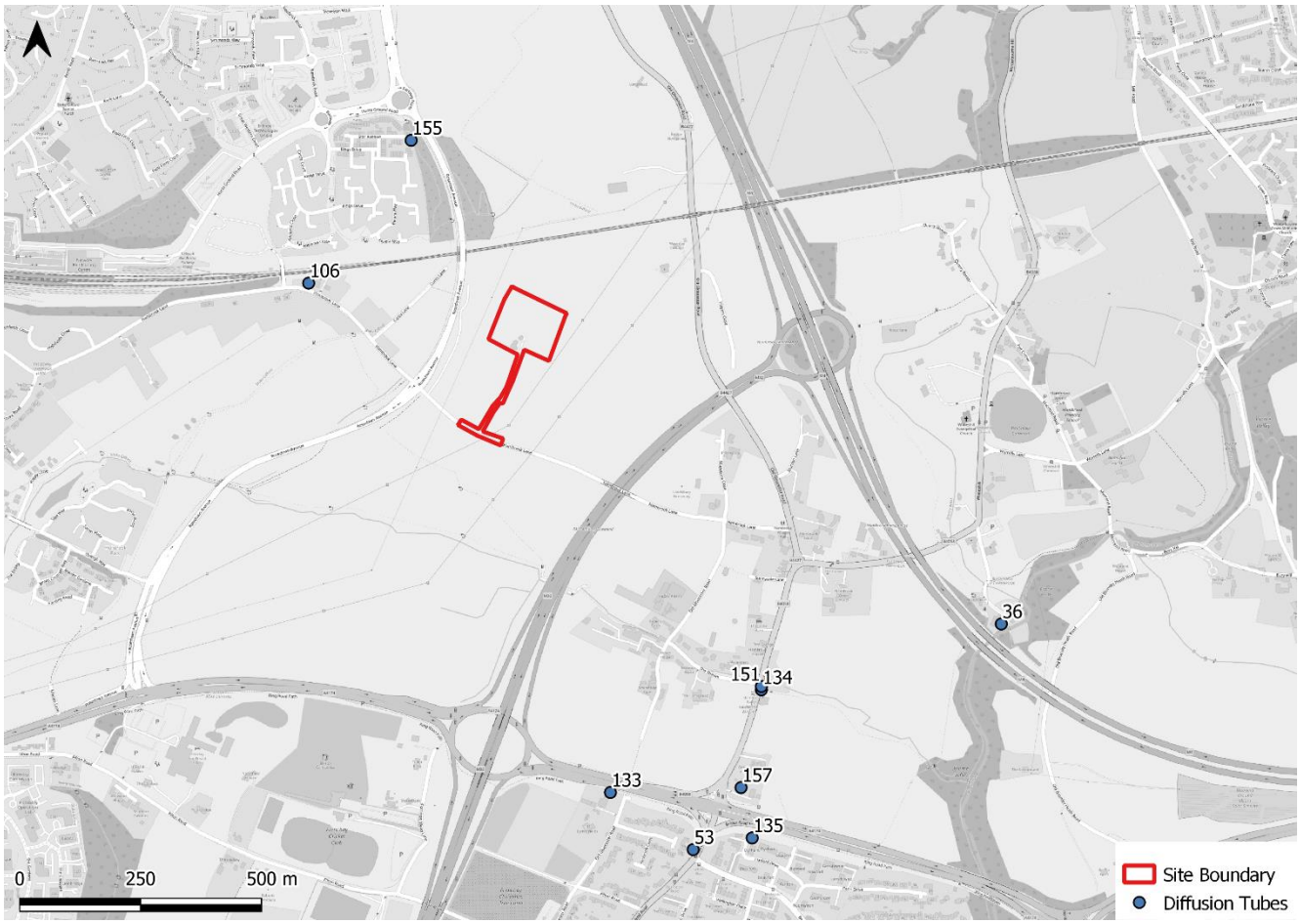

Figure 4 – Diffusion tube monitoring locations

Table 7 - Annual mean NO_2 concentrations ($\mu g/m^3$)

Site ID	Site Name	Site Type	X(m)	Y(m)	Distance from Site (km)	Results ($\mu g/m^3$)				
						2015	2016	2017	2018	2019*
106	Stoke Gifford - 73 Hambrook Lane façade	Other (Railway Line)	363112	179559	0.39	20.1	20.9	20.5	18.7	18.2
155	Stoke Gifford - 3 Earl Close (façade)	Roadside	363324	179854	0.37	17.2	21.8	19.5	19.2	18.0
36	Hambrook – Whiteshill M4 East of M32 Fairwater	Roadside	364544	178855	1.09	19.3	19.4	18.8	18.8	16.2
53	Hambrook – Bristol Road Rear of 17 Fenbrook Close	Roadside	363907	178389	0.93	30	33.7	27.9	27.7	26.2
133	Hambrook - 123 Old Gloucester Road façade (dp)	Roadside	363736	178507	0.75	28.4	30.7	25.6	25.9	25.5
134	Hambrook – Bristol Road, Old Bakery façade (dp)	Roadside	364048	178719	0.74	36	37.4	32.7	28.3	29.5
135	Frenchay – Harford Drive Dyrham Flats	Roadside	364029	178413	0.97	26.8	28.5	27.4	24	23.8
151	Hambrook – Bristol Road Old Bakery FP signpost	Roadside	364048	178726	0.73	39.5	38.8	35.5	29.8	29.2
157**	Hambrook - Bristol Road Poplars House (façade)	Roadside	364006	178517	0.87	30.5	28.7	25.3	23	26.5

Notes: **Bold** values denote exceedance of the Annual Mean NAQO.
*2019 data supplied by SGC EHO and have been corrected for bias - 2019 national Bias Adjustment Factor for Somerset County Council Scientific Services 0.83 (v06/20).
**Site 157 - the diffusion tube was moved from house façade to garage façade in 2019 due to external work to the house. The 2019 OS Grid Refs are: X (Easting) 363999 Y (Northing) 178505.

The data in Table 7 show that annual mean NO_2 concentrations were well below the NO_2 annual mean NAQO for all diffusion tubes in 2019. The highest concentration was measured at tube 134, which was 26.3% below the NAQO. There have not been any recorded exceedances of the NAQO in recent years in the local area, though tubes 151 and 134 have demonstrated levels within 10% of the NAQO in 2015 and 2016. Whilst there are year on year variations in the data, overall, NO_2 concentrations have decreased at all diffusion tubes presented during the period 2015 to 2019 with the exception of tube 155, which has shown a slight increase in NO_2, but remains over 50% below the NAQO.

4.3 Defra Roadside NO_2

The non-compliant link, A4174 ring road between the M32 Junction 1 and the Bromley Heath roundabouts, identified through the national assessment as part of the UK Air Quality Plan for Nitrogen Dioxide was predicted to have an annual mean NO_2 concentration of 41.98 $\mu g/m^3$ in 2018, decreasing to 39.86 $\mu g/m^3$ in 2019[26].

The local monitoring at this location, tubes 53, 133, 135 and 157 all show concentrations of NO_2 below the NAQO in 2019. They also all demonstrate a decreasing overall trend in annual mean NO_2 concentrations.

[26] Defra. "UK Ambient Air Quality Map", https://uk-air.defra.gov.uk/data/gis-mapping/#

5. CONSTRUCTION DUST RISK ASSESSMENT

5.1 Overview

The construction phase of the Development will involve a number of activities that will produce polluting emissions to air. Predominantly, these will be emissions of dust. A such, a qualitative construction dust risk assessment has been carried out in accordance with IAQM Guidance[18].

The risks of impact and the significance of each stage of the construction phase is classified as Negligible, Low, Medium or High, determined against a matrix which considers the distance from source, receptor sensitivity, background pollution concentrations and the potential dust emission magnitude of the works.

The IAQM's guidance states that, from experience of assessing exhaust emissions from site traffic, it is unlikely that any significant adverse impacts on local air quality would be caused and in the vast majority of cases, quantitative assessment is not needed. As such, short term effects of construction traffic emissions have not been assessed, as they are also likely to be well below the IAQM traffic criteria outlined in Table 3.

5.2 Dust Emission Magnitude

5.2.1 Demolition

The existing farmhouse structure on the Site is to be demolished. The volume of this structure is estimated to be well below the threshold of <20,000m^3. Also, the majority of the demolition work is estimated to take place at <10m height. Therefore, the potential dust emission magnitude during this phase is defined as 'Small', with reference to IAQM guidance.

5.2.2 Earthworks

The total area of the Site, is within the IAQM's Large criteria as it is over 10,000m^2, with underlying loamy and clayey soil type[27] which has the potential for high dust release when dry due to the small particle size. However, the total material to be moved is anticipated to be <20,000 tonnes which is within the IAQM's description of a small dust emission magnitude for Earthworks. It is anticipated there would be 5 – 10 heavy earth moving vehicles active at any one time.

When considering the above, the potential dust emission magnitude during this phase is defined as 'Medium', with reference to IAQM guidance.

5.2.3 Construction

The key issues when determining the potential dust emission magnitude during the construction phase include the size of the buildings / infrastructure, method of construction, construction materials, and duration of build.

An estimation of the total volume of the buildings usually forms the main criteria from which the potential dust emissions during the construction phase can be estimated. The total volume of the proposed buildings is within the IAQM's Medium criteria of 20,000m^3 – 100,000m^3.

However, the Development will utilise prefabricated components, whereby the modular units are largely pre-fabricated off-site keeping on site construction to a minimum. This will significantly reduce the emissions of dust generated during the construction phase.

[27] Cranfield University, "Cranfield Soil and Agrifood Institute," n.d., http://www.landis.org.uk/soilscapes/.

The duration of the building works is estimated to be approximately 58 weeks with all on-site roads, foundations and other infrastructure are still being constructed onsite.

When considering the above, it is considered appropriate to define the potential dust emission magnitude during this phase as 'Medium'.

5.2.4 Trackout

The risk of impacts occurring during Trackout is predominantly dependent on the number of vehicles accessing the Site on a daily basis. However, vehicle size, speed and the duration of activities are also factors which are used to determine the risk of impacts.

It is estimated that there would be 10 – 50 HDVs accessing the Site each day during the construction period. Currently site access is via the Hoodlands Farm track which is >100m and currently unpaved. Accordingly, the potential dust emission magnitude during Trackout is considered to be 'Large'.

5.2.5 Summary

Table 8 below shows a summary of the potential dust emission magnitudes from each activity:

Table 8 - Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Medium
Construction	Medium
Trackout	Large

5.3 Sensitivity of Area

Wind data for the closest regionally representative meteorological measurement station to the Site, at Bristol Airport, is shown below in Figure 5. The wind rose shows that the prevailing winds are from the south-west and west. As such, receptors downwind (i.e. north-east and east) of the Site are more sensitive to dust impacts than those located upwind.

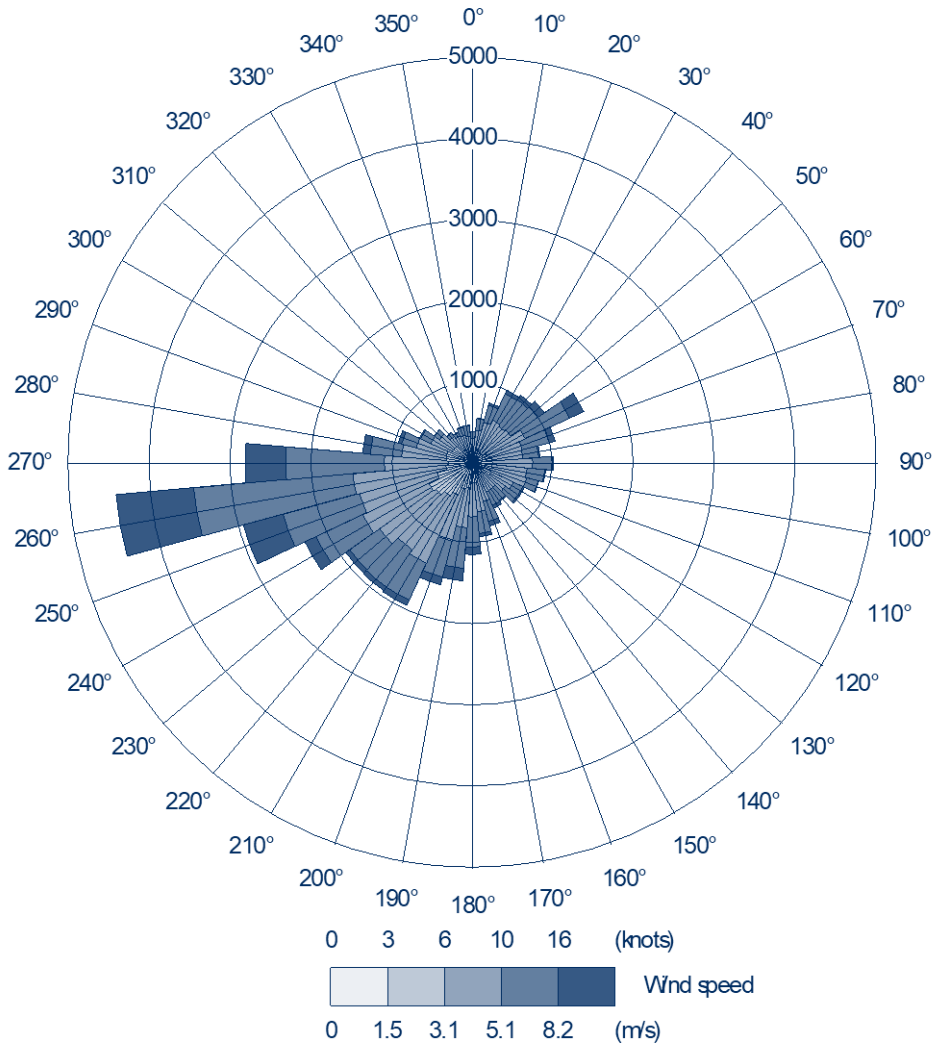

Figure 5 – 2016-2020 wind Rose for Bristol Airport Meteorological Station

Based on the IAQM guidance residential dwellings are considered as high sensitivity receptors in relation to both dust soiling and health effects of PM_{10}. Indicative examples of medium sensitivity receptors include places of work, and commercial / industrial properties. There are existing sensitive human receptors located within 350m of the Site, though most of these are more than 100m from the Site.

Consideration of the phasing of other development being progressed in the area has been made accordingly. It is considered unlikely that other developments will become occupied during the construction phase of the Development. Accordingly, these developments are not included as sensitive receptors in the construction phase assessment. Identified receptors are shown in Figure 6 below:

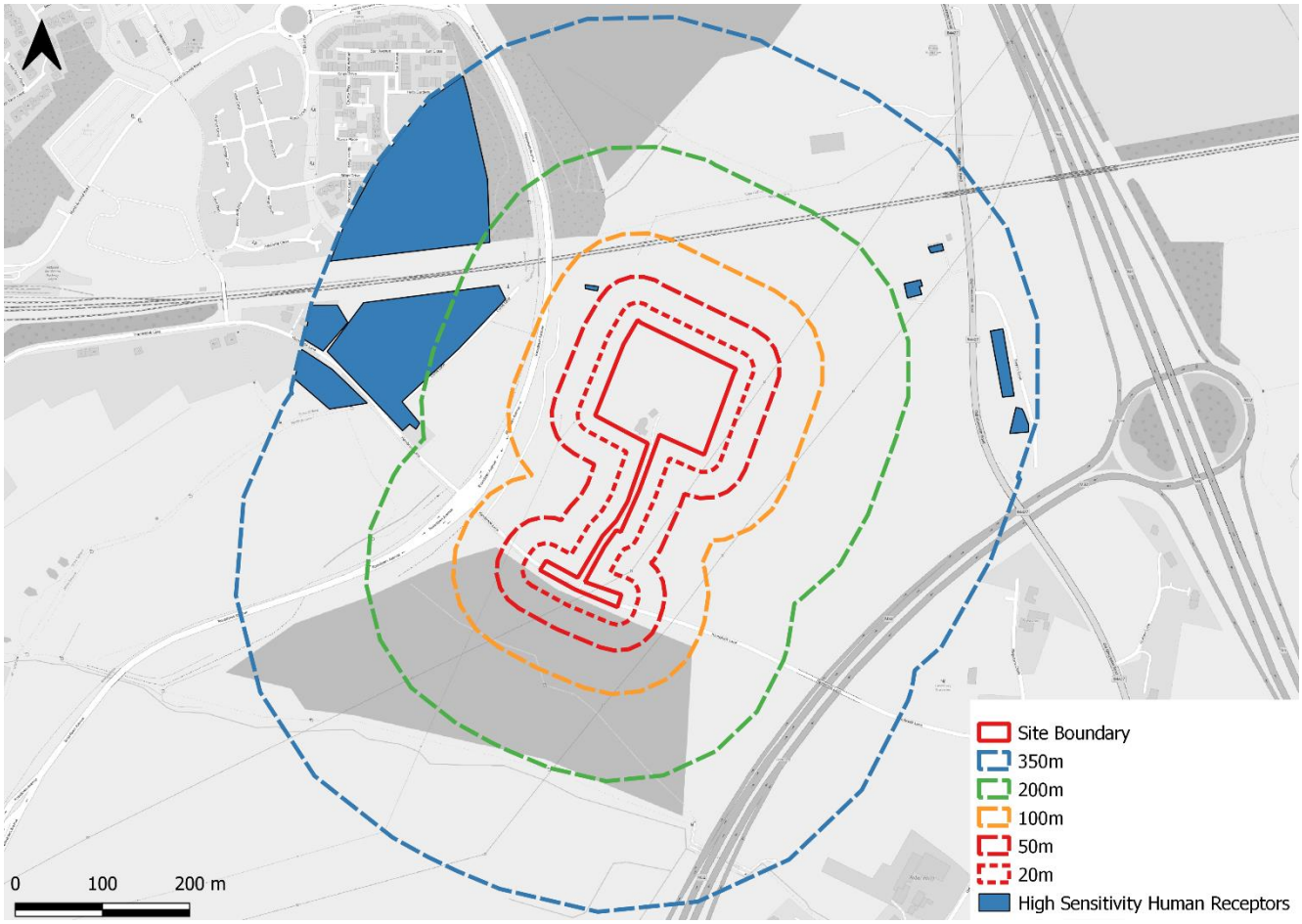

Figure 6 - Dust Assessment Receptors

As shown in Figure 6, there are no medium or high sensitivity receptors located within 50m of the Site boundary. There are also less than 100 high sensitivity receptors located within 100m of the Site boundary. Accordingly, the overall sensitivity of the surrounding area to nuisance dust soiling effects during the Demolition, Earthworks and Construction phases, according to IAQM guidance, is defined as 'Low'.

With regard to Trackout, the sensitivity for sites with a 'Large' potential dust emission magnitude is assessed where receptors are located within 50m from Trackout routes up to 500m from the site. There are 1 - 10 existing high sensitivity receptors located within 20m of potential Trackout routes, and less than 100 high sensitivity receptors located within 50m. Accordingly, the sensitivity of the area to dust soiling impacts from Trackout is defined as 'Medium'.

UK-AIR predictions show that annual mean concentrations of PM_{10} are well below 32 µg/m^3 in the vicinity of the Site (the concentration at which exceedance of the 24-hour NAQO is likely), and are not likely to exceed 24 µg/m^3. According to IAQM guidance, where PM_{10} concentrations are <24 µg/m^3 and there less than 100 high sensitivity receptors within 20m of the Site boundary, the overall sensitivity of the surrounding area to human health impacts is defined as 'Low' for Earthworks and Construction. Similarly, there are less than 100 high sensitivity receptors within 20m of the Trackout route, so the overall sensitivity of the area to human health impacts is defined as 'Low' for Trackout.

The sensitivity of the surrounding area for the potential impacts discussed above are shown in Table 9 below. As no ecological receptors were identified the ecological sensitivity of the study area is not applicable.

Table 9 - Sensitivity of Local Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low	Medium
Human Health	Low	Low	Low	Low

5.4 Risk of Impacts

Using the methodology prescribed in the IAQM guidance, the overall risk of impacts can be defined by combining the sensitivity of the area with the potential dust emission magnitude of each stage of the construction phase as described above.

Table 10 provides a summary of the construction dust risk assessment. Overall, the development is considered to be 'Medium' Risk for nuisance dust soiling effects and a 'Low' Risk for PM_{10} human health effects, in the absence of mitigation. Risks associated with ecological impacts do not apply.

Table 10 - Risk of adverse impacts during construction phase

Potential Impact	Risk of Impacts			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible Risk	Low Risk	Low Risk	Medium Risk
Human Health	Negligible Risk	Low Risk	Low Risk	Low Risk

Section 7 provides site specific mitigation measures to be adopted. The IAQM guidance[18] states that implementing these measures should effectively reduce the risk of impacts to *Negligible* during this phase. On this basis, the residual construction phase effects are considered to be 'not significant'.

The impacts of the construction phase of the Development in isolation are considered to be negligible and the residual effects 'not significant'. Therefore, if there is any overlap with other active construction sites in the EoHSNN allocation, the cumulative impacts should also be negligible provided that the other active construction sites are also implementing the highly recommended mitigation measures from the IAQM guidance.

6. OPERATIONAL ASSESSMENT

6.1 Impact assessment

6.1.1 Development Impact

As previously discussed, the traffic generation from the Development, as provided by JUBB, is not expected to lead to significant impacts on air quality. This is in line with the IAQM guidance on air quality assessment for planning, which when referring to the criteria as set out in Table 3 of this report, states:

> *"If none of the criteria are met, then there should be no requirement to carry out an air quality assessment for the impact of the development on the local area, and the impacts can be considered as having an insignificant effect."*

6.1.2 Cumulative Impact

The Development is within the East of Harry Stoke New Neighbourhood (EoHSNN) strategic allocation, an area where other significant development is progressing. It is recognised that this has the potential to have a cumulative impact on air quality when considered alongside the Development. However, a review of the Approved East of Harry Stoke Outline Application (planning reference: PT16/4782/O) shows that the air quality impacts from all potential development within the EoHSNN allocation have been assessed at Chapter 17 of the supporting Environmental Statement (ES).

A review of this ES shows that the cumulative impact of the whole allocation (which includes the Development) on air quality was considered. The assessment was undertaken on the basis of an average residential density of 37.5 dwellings per hectare (dph) for all land outside of the East of Harry Stoke Outline Application, in line with the SGC Core Strategy (adopted 2013)[16]. This allowed for a greater density of dwellings than the Development will provide (approximately 27.6 dph[28]) and therefore considers the impact of the current Development at Hoodlands Farm.

The findings of the ES show that the cumulative impact on air quality was not significant for NO_2, PM_{10} and $PM_{2.5}$. The assessment used 2020 Emission Factors for road traffic and 2020 background data, for a future year assessment of 2031, therefore it is considered a robust and conservative assessment that is still applicable. Based on this, the cumulative impact of the Development with the wider allocation is considered to be **not significant** in accordance with the findings of the ES.

6.1.3 Summary of Impact

Based on the above, the impact of the Development on air quality, both when considered alone, and cumulatively with the EoHSNN allocation, is likely to be **not significant**.

[28] Based on the Site area of 1.81 ha and 50 residential dwellings.

6.2 Exposure assessment

As the Development is located set back from major roads and no significant points sources have been identified from a review of the NAEI, it is considered appropriate to assess the risk of exposure to poor air quality qualitatively.

6.2.1 Risk of Exposure from the Local Highway

There are several major roads in the local area that are considered to be significant sources of vehicles emissions and therefore air pollutants. These are the M4 Motorway, the M32 and the Stoke Gifford Bypass.

The Stoke Gifford Bypass is the closest road and is approximately 80m to the west of the Site. Defra's AEA Diffusion Tube Guidance specifies criteria that are indicative of a location at urban background concentrations. These criteria are:

- >50m from any major source of NO_2 (e.g., multi-storey car parks);
- >30m from any 'very busy' road (>30,000 vehicles per day);
- >20m from a 'busy' road (10,000 – 30,000 vehicles per day);
- >10m from any 'main' road; and
- >5m from locations where vehicles may stop with their engines idling.

The Stoke Gifford Bypass is assumed to have traffic flows >30,000 AADT, as a worse case, classifying it as a 'Very Busy' road. Therefore, at distances of 30m, emissions would disperse to background contributions only. Similarly, the risk of exposure to emissions from the M4 and M32 can be considered using the AEA Diffusion Tube guidance criteria. Both these sources would be classified as Major Sources and therefore it would be expected that NO_2 concentrations will have reduced to the urban background concentrations at >50m from these roads.

Receptor locations within the Development are approximately 80m from the closest 'Very Busy' road and therefore would classify as an urban background site. On this basis, it is anticipated that NO_2 concentrations at the Site would be comparable to the local urban background concentrations, which are well below the NAQO as shown by the UK-AIR backgrounds reported in section 4.1.

With regard to the motorway network, the Design Manual for Roads and Bridges LA 105: Air Quality uses a screening criterion of 200m from the affected road network. When considering this more conservative criteria for motorways, the Development is greater than 200m from both the M32 (>250m) and M4 (>400m). Therefore, the risk of exposure from these sources is considered not significant.

6.2.2 Risk of Exposure from Railway Emissions

Defra's LAQM.TG(16) can be used to assess the risk of exposure to emission from railway locomotives at the Site. This guidance states that where relevant exposure, such as residential receptors, are located within 30m of moving locomotives, the line may require further consideration. As the Development is greater than 75m from the railway line, the risk of exposure to emission from rail locomotives is not significant, and further consideration of emissions from this source is not necessary.

Additionally, diffusion tube 106 monitors railway emissions as stated in the SGC 2019 ASR[21]. The annual mean concentration of NO_2 at this diffusion tube has been well below the NAQO for NO_2 in recent years. It is also located closer to the railway line than the Development. On this basis, it is considered that the risk of emissions from the railway line at the Development is low.

6.2.3 *Fall-Off with Distance Calculation*

Defra's Fall-Off with Distance Calculator can be used to estimate the concentration of NO_2 at locations that are close to a diffusion tube NO_2 monitoring site. This technique is used below to assess the risk of exposure from the Stoke Gifford Bypass, supplementing the discussion above.

Note, Defra's Covid-19 Supplementary guidance[19] states that Covid-19 has had a negligible impact of this LAQM tool. It is also worth noting that 2019 diffusion tube data is used here, so the calculation inputs and results are not impacted by the pandemic.

Diffusion tube 155 monitors the roadside concentrations of NO_2 along the Stoke Gifford Bypass. A Fall-Off with Distance calculation can be performed to estimate the NO_2 concentration at 50m distance from this road (the maximum distance which can be used in the calculation). As the location of residential receptors within the Site are at greater than 50m from this road, it is considered this calculation will represent a conservative estimate of concentrations at the Site. The inputs to the calculation are shown in Table 11 below, which has been performed using 2019 concentrations. Note, as the distance applied to this calculation is 50m, the results represent an estimate and should be viewed with caution.

Table 11 - Fall-Off calculation Inputs

		Distance (m)		Concentration of NO_2 (µg/m^3)		
Site ID	Road	Monitoring Site to Kerb	Receptor to Kerb	2019 UK-AIR Background	Monitored at Site	Predicted at Receptor
155	Stoke Gifford Bypass	10	50	17.69	18.0	17.8

The results of the calculation show that annual mean NO_2 concentrations are expected to disperse to 17.8µg/m^3 at 50m distance from the Stoke Gifford Bypass, which is only slightly above the UKAIR predicted background concentration. It has been assumed that the monitored data at this diffusion tube is broadly representative of NO_2 along the section of road adjacent to the Site. Accordingly, annual mean NO_2 at the Site is unlikely to exceed the NAQOs.

6.3 Suitability of Site

From the above, it is concluded that the Development is not expected to introduce any new receptors into an area of existing poor air quality and therefore is suitable for residential use.

7. MITIGATION MEASURES

7.1 Construction Phase

The qualitative construction dust risk assessment shows that the Development is Medium Risk for adverse impacts during construction, as a worst-case, in the absence of mitigation.

To effectively reduce the risk of impacts to negligible, appropriate mitigation measures should be adopted. The IAQM's highly recommended mitigation measures for Medium Risk sites is provided at Appendix A of this report.

Implementing these measures should effectively reduce the risks of construction phase impacts on the local area to negligible.

7.2 Operational Phase

From the above evidence in this report, it has been concluded that the Development is, in terms of air quality, suitable for residential use and the risk of exposing new receptors to poor air quality is low. On this basis, the Site is considered suitable for residential use.

The operational phase of the development is not likely to have a significant impact on the local air quality, as the traffic flows are below the IAQM threshold for detailed assessment. Therefore, no mitigation should be required in terms of air quality.

However, the transport consultants for the scheme, JUBB, have prepared a Framework Travel Plan for the scheme. The measures within this plan that support or incentivise the use of sustainable transport will be beneficial in terms of air quality, as will lead to a reduction in the number of polluting trips generated by the Development.

Also, the IAQM's best practice guidance[17] for on-site parking could be considered as an additional measure to benefit air quality. Where parking is provided for residential dwellings, Electric Vehicle (EV) charging points for each parking space could be provided. This could be in the form of 'EV Ready' passive parking provision, with a percentage also compromising active provision. This would incentivise the use of Electric Vehicles which are beneficial to air quality.

8. DISCUSSION AND CONCLUSION

Hydrock have been commissioned to prepare an Air Quality Assessment (AQA) for the proposed residential development located at Hoodlands Farm, north of Hambrook Lane, Bristol.

UK-AIR background concentrations and local air quality monitoring have been used to establish baseline air quality conditions in the area. This shows that both modelled and monitored concentrations of air pollutants in the area and at the Site are well below the NAQOs.

A qualitative construction dust risk assessment has been undertaken in line with IAQM guidance. It has been shown that the construction phases of the Development could give rise to emissions that are Medium Risk for dust soiling effects on adjacent use and a Low Risk for human health impacts. However, by adopting appropriate mitigation measures to reduce emissions and their potential impact, such as those recommended in this report, there should be no significant residual effects.

The potential exposure of future occupants at the Site has been qualitatively assessed taking into consideration the local highway network and the railway to the north of the Site. The risk of exposure to NAQO exceedances due to emissions from both the local highway and the railway has been shown to be low, based on the distance of proposed receptors from these pollutant sources. Therefore, it is concluded the Site is suitable, in terms of air quality, for the proposed residential use.

By following screening criteria provided in EPUK and IAQM guidance, the need for detailed dispersion modelling to assess the significance of potential impacts has been scoped out of this assessment given the development generated traffic is below the threshold criteria, including in the Bristol AQMA. Therefore, as stated by EPUK and IAQM guidance, it is likely that any potential effects of the Development on air quality would be not significant. The cumulative in combination impact of the Development is also considered from a review of the East of Harry Stoke Outline Application ES, which concluded no significant impacts would occur. Therefore, no mitigation should be required in terms of air quality.

However, the transport consultants for the scheme, JUBB, have prepared a Framework Travel Plan for the scheme. The measures within this plan that support or incentivise the use of sustainable transport will be beneficial in terms of air quality, as will lead to a reduction in the number of polluting trips generated by the Development.

Also, the IAQM's best practice guidance[17] for on-site parking could be considered as an additional measure to benefit air quality. Where parking is provided for residential dwellings, Electric Vehicle (EV) charging points for each parking space could be provided. This could be in the form of 'EV Ready' passive parking provision, with a percentage also compromising active provision.

From the evidence presented, and by following the guidance provided herein, the Development will comply with all relevant air quality policy, including Policy PSP21 of the Policies, Sites and Places Plan. As such, air quality should not pose any significant obstacles to the planning process.

Appendix A - Construction Dust Mitigation for Medium Risk sites

In order to mitigate the worst-case dust impacts the following general mitigation measures are highly recommended by the IAQM for Medium Risk construction sites. Highly recommended mitigation measures applicable specifically to Earthworks, Construction and Trackout are provided based on the respective risk of adverse impact.

Highly Recommended

Communications:

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- 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
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM10 continuous monitoring and/or visual inspections.

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 off-site, 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.
- 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.

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 the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel:

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable
- 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.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

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.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up.

Waste Management:

- Avoid bonfires and burning of waste materials.

Measures specific to Trackout (Medium risk)

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.

- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.