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ONE HORTON HEATH, INTERNAL DISTRIBUTOR ROAD
Air Quality Assessment – Revision B

ONE HORTON HEATH, INTERNAL DISTRIBUTOR ROAD Air Quality Assessment

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ONE HORTON HEATH, INTERNAL DISTRIBUTOR ROAD

Air Quality Assessment

Revision B

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Registration of Amendments

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By
Rev A 09/11/23	Incorporating minor changes to layout and client's comments	JB	TR
Rev B 22.11.2023	Final issue	TR	JDB

1.0 INTRODUCTION

Summary

- 1.1 Create Consulting Engineers Ltd (CCE) have been appointed by One Horton Heath team on behalf of Eastleigh Borough Council (EBC) to undertake an Air Quality Assessment (AQA) in support of the standalone planning application of the Internal Distributor Road at One Horton Heath.
- 1.2 The proposed development site is located in the rural land to the west of Horton Heath in Hampshire, consisting of 310 acres of farmland and a solar panel park.
- 1.3 The area bound by Horton Heath to the east and farmland to the south, west and north. The site is also surrounded by industrial units to the west, north and southwest. There is a railway line that runs adjacent to part of the southeast boundary.
- 1.4 The development is approximately 1.7 km from the closest section of the M27 and over 2.5 km away from Southampton Airport. The application is for the construction of an internal distributor road with associated footways, cycleways, lighting, drainage and landscaping at One Horton Heath.
- 1.5 The development comprises a large parcel of land which will be subdivided into eleven smaller parcels and developed in phases over the coming years. The latest Masterplan proposes up to 2,500 dwellings, Local Centre, Primary School, and Commercial Floorspace. A blue line site boundary and parcel layout is shown in Figure 1.1. A red line site boundary is depicted in Figure 1.2.
- 1.6 The proposed development has been designed in full accordance with the Development Plan and Outline Planning Application (OPA) O/20/89498, which has a resolution to grant consent subject to S106 negotiations relating to education. This application is for full planning consent due to the time for these negotiations to complete. Submitting details of the Secondary Infrastructure Road (SIR) as a full planning application will deliver SIR in accordance with, and as part of the OPA, but enable commencement more quickly than waiting for the resolution of the OPA S106 and the determination of an application for Reserved Matters Approval of details of the SIR.
- 1.7 This report addresses the impact from the Internal Distributor Road on nearby future and existing receptors. The road will pass through the development, joining the Primary Road to areas of One Horton Heath and the existing Horton Heath.
- 1.8 This report does not make any assumptions or considerations to the smaller parcels of land which will be submitted within a sperate planning application.

Assessment Scope

- 1.9 This report considers potential air quality impacts associated with both the construction and operation of the development. Likely changes to air quality in the area, as a result of the proposed development, have been considered in relation to the UK Air Quality Objectives (AQOs) and EU Air Quality Standards. Also, where required, the air quality assessment considers mitigation measures to reduce the effect of the proposed development upon local air quality.
- 1.10 In terms of the construction impacts, the development proposal will have the potential to generate dust, particulate matter (PM₁₀) during the construction phases. These impacts are assessed in accordance with Institute of Air Quality Management's (IAQM's) *Guidance on the assessment of dust from demolition and construction* (2014).
- 1.11 Vehicle movements generated during the operation of the development will give rise to NO₂, PM₁₀ and PM_{2.5} emissions which will have potential impacts to worsen air quality within the area.
- 1.12 The Internal Distributor Road will introduce new vehicles as a main source of pollution, to the area. Vehicles movements will give rise to NO₂, PM₁₀ and PM_{2.5} emissions, and therefore has the potential to worsen the current air quality within the area and impact any existing sensitive receptors, located nearby in Horton Heath. As such, an AQA is required to determine potential impacts associated with the proposed development.

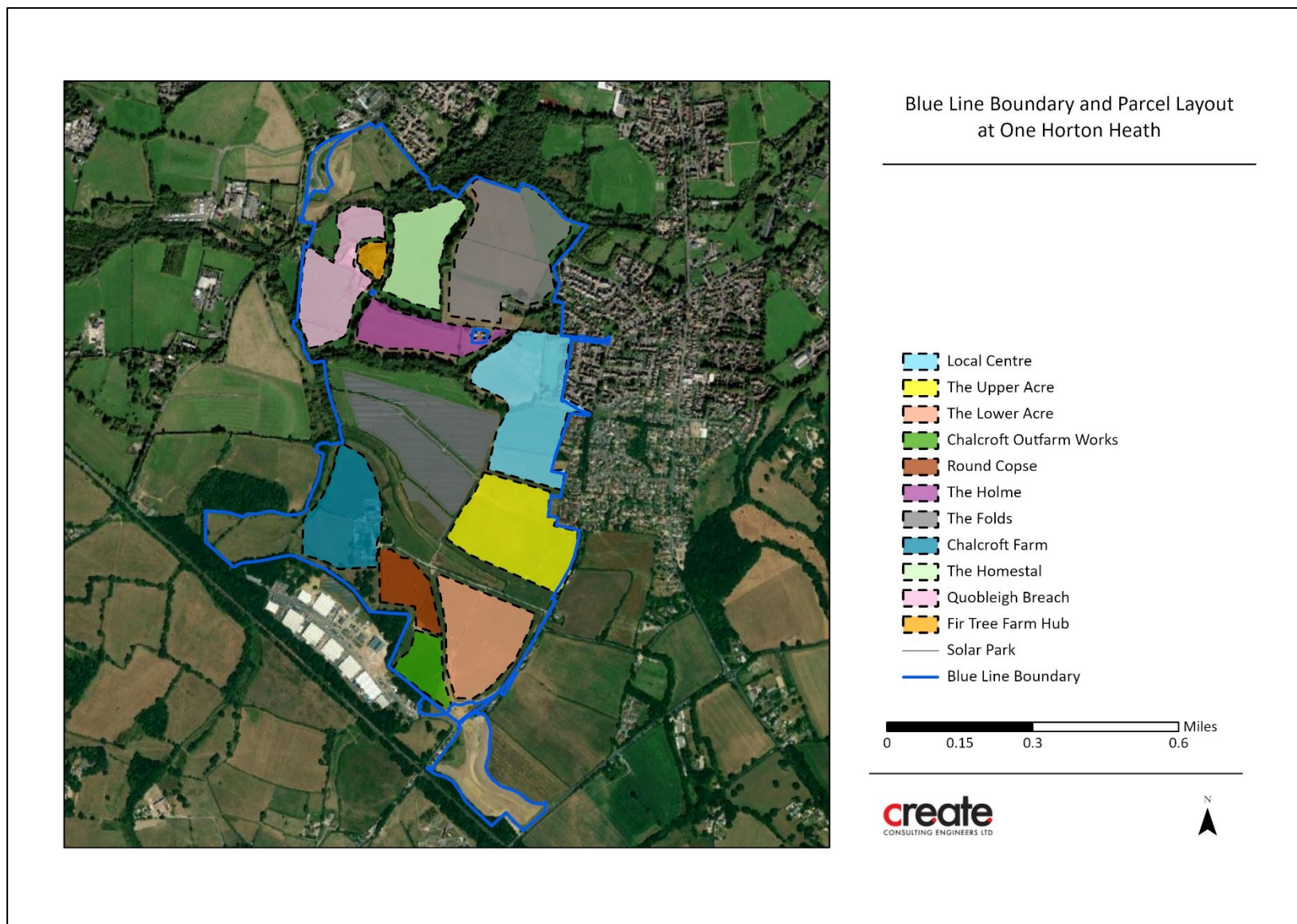


Figure 1.1: Blue Line Boundary and Parcel Layout

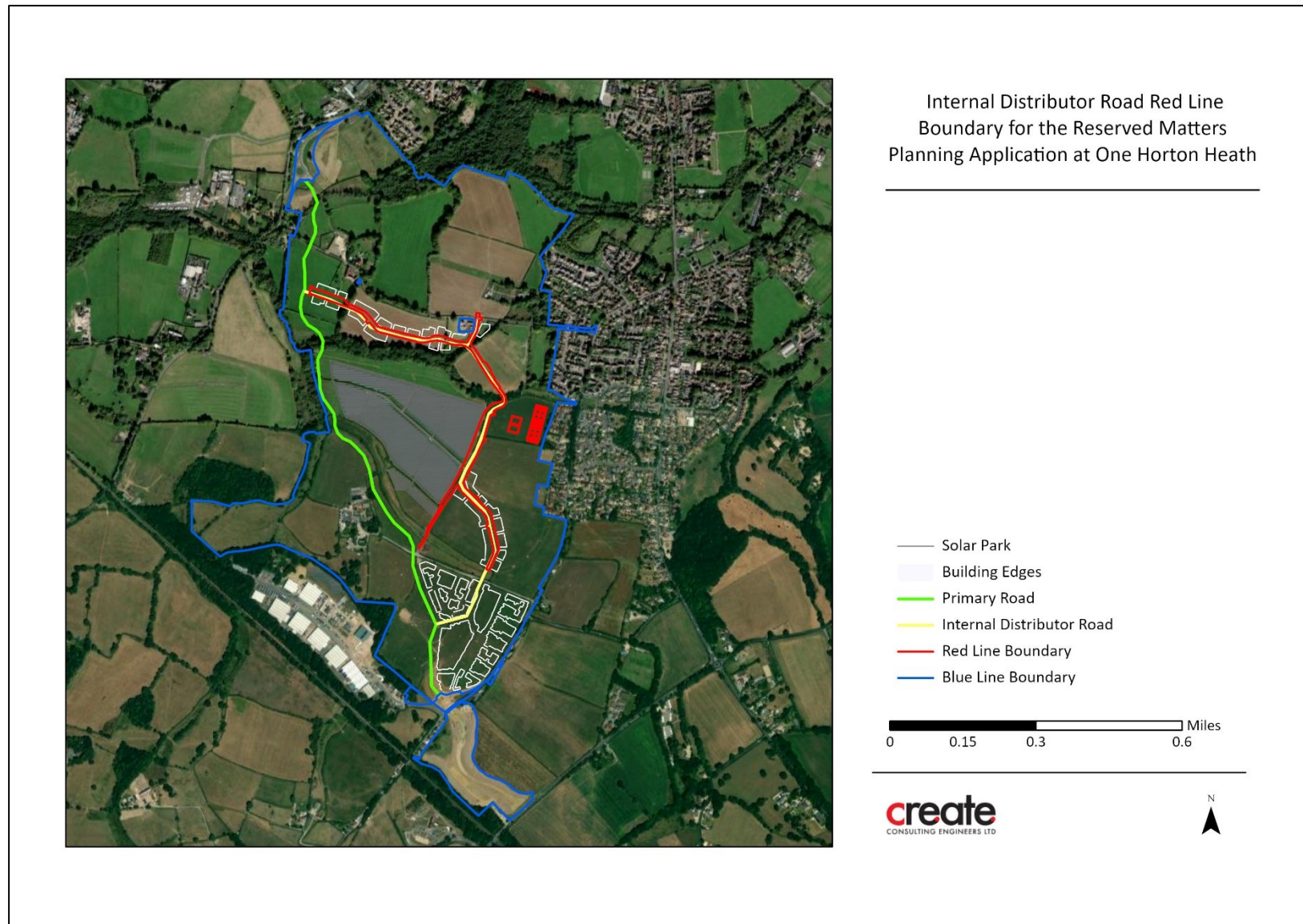


Figure 1.2: Internal Distributor Road Red Line Boundary

2.0 LEGISLATION AND POLICY CONTEXT

The Air Quality Strategy

- 2.1 The Environment Act 1995 placed a responsibility on the UK Government to prepare an Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland. The most recent version of the strategy (2007) sets out a framework for reducing air pollution in the UK and includes a number of AQOs for specific pollutants.
- 2.2 The 1995 Act also requires that Local Authorities “review and assess” air quality in their areas, following a prescribed timetable. The Review and Assessment process is intended to locate and spatially define areas where the UK AQOs are not being met. In such instances, the Local Authority is required to declare an AQMA, carry out a Further Assessment of air quality, and develop an Air Quality Action Plan (AQAP), which should include measures to improve air quality so that the objectives may be achieved in the future.
- 2.3 The timetables and methodologies for carrying out Review and Assessment studies are prescribed in DEFRA Technical Guidance – Local Air Quality Management Technical Guidance (LAQM.TG22).
- 2.4 Table 2.1 lists the objectives relevant to this assessment that are included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purposes of LAQM.

Pollutant	Air Quality Objective	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³	1-hour mean not to be exceeded more than 18 times per year
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³	24-hour mean not to be exceeded more than 35 times per year
	40 µg/m ³	Annual mean
Particulate Matter (PM _{2.5})	25 µg/m ³	Annual mean

Table 2.1: Air Quality Objectives (England)

- 2.5 The National Planning Policy Framework (NPPF), 2021 paragraph 186 notes that 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.
- 2.6 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.

- 2.7 The National Planning Practise Guidance (NPPG) (Reference ID: 32-008-20140306), states that air quality assessments and resulting mitigation measures must be location specific and proportionate to the nature/scale of development proposed and the level of concern about air quality.

Environmental Protection Act 1990 – Control of Dust and Particles Associated with Construction

- 2.8 The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

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

- 2.9 Enforcement of the Act, in regard to nuisance, is currently under the administration of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practice measures.

Clean Air Strategy

- 2.10 The UK government released its Clean Air Strategy In 2019 as part of its 25 Year Environment Plan. The Strategy sets out the comprehensive action that is considered to be required from across all parts of government and society.
- 2.11 The primary focus of air quality management has primarily been related to NO₂ and its principal source in the UK, road traffic. The 2019 Strategy aims to broaden the focus to other areas, including actions on clean growth, emissions from domestic wood burning stoves, industry and agriculture.

Local Planning Policy

EBC Local Plan 2016 – 2036

- 2.12 Policy DM8 details EBC’s approach to “Pollution” with regards to proposed developments.
1. Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through:
 - a) ...Air pollution (including odours or particulate emissions)...
 2. Development susceptible to particular forms of pollution will not be permitted:
 - a) where it will be adversely affected by such pollution, unless measures can be taken that adequately mitigate the polluting effects; or
 - b) where it would inhibit existing economic or other activities giving rise to acceptable polluting effects.
- 2.13 One Horton Heath forms part of a strategic development site, noted in Policy HH1 as “*Land West of Horton Heath*”. The policy details the following requirements for the development design. A map of the area addressed in Policy HH1 is depicted in Figure 2.1.
- 2.14 An area of approximately 125 hectares of land to the west of Horton Heath, east of Allington Lane and north of the railway line as defined on the policies map is allocated as a strategic location for development to include approximately 1,500 dwellings, 6ha of employment land, open space, retail and community facilities including a primary school and a new link road to Bubb Lane. Development will be subject to the approval by the Borough Council of a set design principles and a high-level design code including a developed masterplan.



Figure 2.1: Site Map of Designated Area in Policy HH1

2.15 Strategic Policy S3 outlines the EBC's approach to "Location of New Housing" in regard to Horton Heath.

1. The Borough Council will focus as much new housing development as possible within the existing urban areas, with the remainder on greenfield sites in the form of a number of larger strategic sites, urban extensions and a number of smaller sites to meet more local needs. The Council proposes:
 - b) The development of approximately 5,960 dwellings on strategic sites with planning permission at:
 - i. ...West of Horton Heath (1,500 dwellings) (HH1)...
2. The Council anticipates that the new housing development identified in this policy will be delivered in accordance with the housing trajectory.

Air Quality Action Plan 2020 – 2025

2.16 The AQAP provides guidance on Planning Policy in regard to air quality. Air quality considerations are taken into account in any of the following cases:

- Where the development is proposed within, or adjacent to, an AQMA.
- Where the development or the associated traffic could result in the designation of an AQMA.
- Where the granting of planning permission would conflict with, or render unworkable, elements of any local Air Quality Action Plan or Strategy.
- Where it is expected that the development may have a substantial impact on the local air quality or future occupiers of the development may be subject to unacceptable air quality then the Council may require a suitable air quality impact assessment to be carried out prior to consideration of the application.

Key Guidance Documents

Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)

2.17 This guidance provides advice, methodology and criteria to assess the dust impacts that arise from construction activities. This assessment evaluates the impact of dust soils and human health impacts during the demolition, earthworks, construction and trackout activities. The methodology is replicated in Appendix A of this report.

Land Use Planning and Development Control: Planning for Air Quality (EPUK-IAQM, 2017)

- 2.18 This guidance includes a method for screening the requirement for an air quality impact assessment and whether a detailed assessment is required. The methodology is reproduced in Appendix B of this report.

Local Air Quality Management Technical Guidance (LAQM.TG22)

- 2.19 This technical guidance is used by local authorities in their review and assessment work. LAQM is a statutory process through which local authorities are required to monitor, assess, and take actions to improve local air quality.
- 2.20 Within this guidance, Box 1.1 contains examples where air quality objectives should apply. Annual mean objectives for NO₂ and PM₁₀ should apply at locations where members of the public might be regularly exposed, including building façades of residential properties, school, hospitals and care homes.
- 2.21 The following impacts should be assessed with the consideration of cumulative effects from other planned or proposed developments within the area:
- Impact of the proposed development upon the local air quality; and
 - The impact of local air quality on the receptors using the development.

3.0 BASELINE CONDITIONS

3.1 Baseline data was gathered from the following sources:

- EBCs 2020 Air Quality Annual Status Report;
- DEFRA's UK AIR website; and
- DEFRA's national air quality background maps 2018.

Local Air Quality Management

3.2 As required by the Environment Act (1995), EBC has undertaken a review and assessment of air quality within their administrative area. This process concluded that annual mean there are annual NO₂ concentrations above the AQO in four administrative regions of the council. These are:

- **Eastleigh AQMA No1 (A335):** *"The AQMA encompasses an area extending 30m to either side of the A335 from the junction of Leigh Road and Bournemouth Road to Wide Lane (north of the roundabout with the M27 spur), and a 15m corridor each side of Woodside Avenue north from the junction with the A335 Leigh Road and Passfield Avenue to the railway bridge, Twyford Road north from the junction with Romsey Road and A335 Station Hill to the junction with St Catherines Road, and the B3037 Bishopstoke Road west from junction with the A335 Station Hill to and including the roundabout with Chickenhall Lane."*
- **Eastleigh AQMA No2 (M3):** *"An area extending either side of the M3 motorway between junctions 12 to 14."*
- **Hamble Lane Area AQMA:** *"An area incorporating the B3397 Hamble Lane from its junction with the A3025 Portsmouth Road, north to its junction with the Windhover roundabout - The Windhover roundabout - The A27 from the Windhover roundabout in a south easterly direction to the Borough boundary with a 30m corridor either side."*
- **High Street Botley:** *"The designated area incorporates the A334 from the Borough boundary east of the junction with the B3354, Winchester Street, to Maypole Roundabout junction with Woodhouse Lane incorporating Broad Oak and a 5m corridor either side of it."*

3.3 EBC has concluded that concentrations of all other pollutants considered within the ASR are currently below their relevant AQOs and no further AQMAs have been designated.

3.4 The proposed development does not lie within or close to an AQMA.

Air Quality Monitoring Data

3.5 Monitored data was taken from EBC 2020 Air Quality Annual Status Report.

Automatic Monitoring Locations

- 3.6 EBC operated three continuous automatic monitoring stations throughout the administrative boundary in 2019. The monitoring station ES1 is located approximately 3.54 km west of the centre of One Horton Heath. Measured concentrations for this location are depicted in Table 3.1.

Site ID	Site Name	Site Type	NGR		Air Pollutants	Annual Mean Concentrations ($\mu\text{g}/\text{m}^3$)			
			X	Y		2016	2017	2018	2019
ES1	Southampton Road	Roadside	445495	118237	NO ₂	40.8	37.4	37.8	34.1
					PM ₁₀	22.2	20.9	22.5	21.1

Notes:

Exceedances of the Annual AQO are highlighted in **bold**.

Table 3.1: NO₂ and PM₁₀ Automatic Monitoring Results

- 3.7 As indicated in Table 3.1, annual NO₂ concentrations monitored at ES1 exceeded the annual mean AQO in 2016. After 2016, there have been no exceedances of the NO₂ AQO. Annual PM₁₀ concentrations have not exceeded the AQO in recent years.
- 3.8 ES1 is located on a main road and therefore is not indicative of the current site. However, may be indicative of the main roads built within the proposed development area.

Non-Automatic Monitoring Locations

- 3.9 EBC operated 53 passive monitoring stations (diffusion tubes) within the area in 2019. Table 3.2 shows diffusion tube monitoring results within 3.5 km of the centre of One Horton Heath.

Site ID	Site Name	NGR		Site Type	Annual Mean NO ₂ Concentrations ($\mu\text{g}/\text{m}^3$)			
		X	Y		2016	2017	2018	2019
BOT	Botley Road	449634	117382	Roadside	36.50	34.40	32.50	31.90
WYV	Wyvern School	449577	118165	Roadside	32.20	25.00	29.50	24.10
FORSL	Fair Oak Road/Sandy Lane	448788	118553	Roadside	33.20	30.20	28.00	28.00
FOR	Fair Oak Road	447427	118780	Roadside	23.50	22.90	21.90	20.10
JW	Jukes Walk	447690	114912	Roadside	27.90	24.80	24.70	21.30
BR	Bishopstoke Road	446604	119149	Roadside	34.50	33.00	33.40	33.80
AL	Allington Lane	445908	115544	Roadside	28.00	25.20	25.10	23.50
CR	Campbell Road	445750	118111	Industrial	33.00	35.00	35.10	32.30

Table 3.2: NO₂ Diffusion Tube Monitoring Results

- 3.10 Table 3.2 shows in recent years, there have been no exceedances of the annual mean NO₂ AQO.
- 3.11 The majority of the roads are located within residential areas, and therefore not indicative of the current site. However, all locations show an indication of the concentration expected during the operational phase of the development.
- 3.12 Location's JW and AL are situated within close proximity of the M1 and show the levels of concentrations that travel from the busy motorway. In both instances, these concentrations are well below the AQO, showing that the M1 does not pose a risk to the proposed development area.

Mapped Background Pollution

- 3.13 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 Local Authorities (LAs) in their Review and Assessment of air quality.
- 3.14 The proposed development site is located in several grid squares. Predicted background concentrations for the following grid squares are used for the Internal Distributor Road:
- 448500, 117500;
 - 449500, 117500;
 - 448500, 116500; and
 - 448500, 116500.
- 3.15 Data for these locations are downloaded from the DEFRA website and summarised in Table 3.3. The background concentrations have been shown for 2019 (baseline year) and 2030 (future year).

X	Y	Pollutant	Predicted Background Concentration (µg/m ³)	
			2019	2030
448500	117500	NO _x	17.76	12.89
		NO ₂	13.12	9.78
		PM ₁₀	14.06	13.03
		PM _{2.5}	9.48	8.67
449500	117500	NO _x	17.06	12.35
		NO ₂	12.66	9.41
		PM ₁₀	13.64	12.60
		PM _{2.5}	9.50	8.65
448500	116500	NO _x	18.92	13.54
		NO ₂	13.89	10.23

X	Y	Pollutant	Predicted Background Concentration (µg/m³)	
			2019	2030
		PM ₁₀	13.55	12.50
		PM _{2.5}	9.38	8.57
449500	116500	NO _x	18.41	13.25
		NO ₂	13.55	10.03
		PM ₁₀	13.56	12.52
		PM _{2.5}	9.44	8.63
Average Across Four Grid Squares		NO _x	18.04	13.01
		NO ₂	13.31	9.86
		PM ₁₀	13.70	12.66
		PM _{2.5}	9.45	8.63

Table 3.3: DEFRA Predicted Background Concentrations

- 3.16 As shown in Table 3.3, background concentrations do not exceed the relevant AQOs and are predicted to reduce further in the opening year. The predicted concentrations are significantly lower than the monitored data in the built-up regions. It is expected that these concentrations reflect the existing area, however not the proposed development.

4.0 DISPERSION MODEL ASSESSMENT INPUTS

Assessment Inputs

- 4.1 The built and occupied development has the potential to expose future site users to elevated pollutant concentrations. In order to assess NO₂ and PM₁₀ and PM_{2.5} concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

Dispersion Model

- 4.2 Dispersion modelling was undertaken using the ADMS-Roads Extra dispersion model (version 5.0.1.3). ADMS-Roads Extra is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

Input Data

- 4.3 The model requires input data that details the following parameters:

- Emission Factors
- Traffic Flow Data;
- Sensitive Receptor Points;
- Energy Inputs;
- Meteorological data;
- Roughness length;
- Monin-Obukhov length; and
- Background Concentrations.

Emission Factors

- 4.4 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 11.0) released in November 2021.

Traffic Flow Data

- 4.5 Vehicle speeds were estimated based on the free flow 'potential' of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards.
- 4.6 In accordance with the modelling methodology, different speeds for road links have been used for the base plus development traffic approaching at busy junctions and delays during

peak/off peak. The road width stayed the same for all modelling scenarios, except S4, where canyons were added. The mean vehicle speed stayed the same for all modelling scenarios, except at Fir Tree Lane where part of the road changes from 96 kph, in 2019, to 48 kph, in all 2030 scenarios.

- 4.7 Canyons were input into the model where height of the surrounding structures exceed the road width or where structures are likely to impact the movement of air. Modelling Scenario S4 includes the addition of canyons created by the buildings along the Internal Distributor Road and the change in width of the road, created by the canyon effect. For these parameters, the shortest road width with the height of the tallest building was used. This is shown in Table 4.1.
- 4.8 Traffic data for use in the assessment included 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition. This data was obtained from the Department for Transport (DfT) Traffic Counts Website and the Transport Consultants for this project, Campbell Reith.
- 4.9 The DfT Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2021. It should be noted that the DfT matrix is referenced in DEFRA guidance LAQM.TG22 as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.
- 4.10 DfT data was used to provide AADT flows for the modelled for the baseline modelling scenario, S1. The baseline model was verified against four monitoring locations within two nearby areas, M27 and Botley Road in Horton Heath. These parameters are shown in in Figure 4.1. The traffic data is summarised in Tables 4.1 and 4.2.
- 4.11 Campbell Reith provided AADT flows for the future year modelling scenarios in 2030, S2 to S4. The road links are summarised in Figure 4.2 and the traffic details are provided in Tables 4.1 and 4.2.

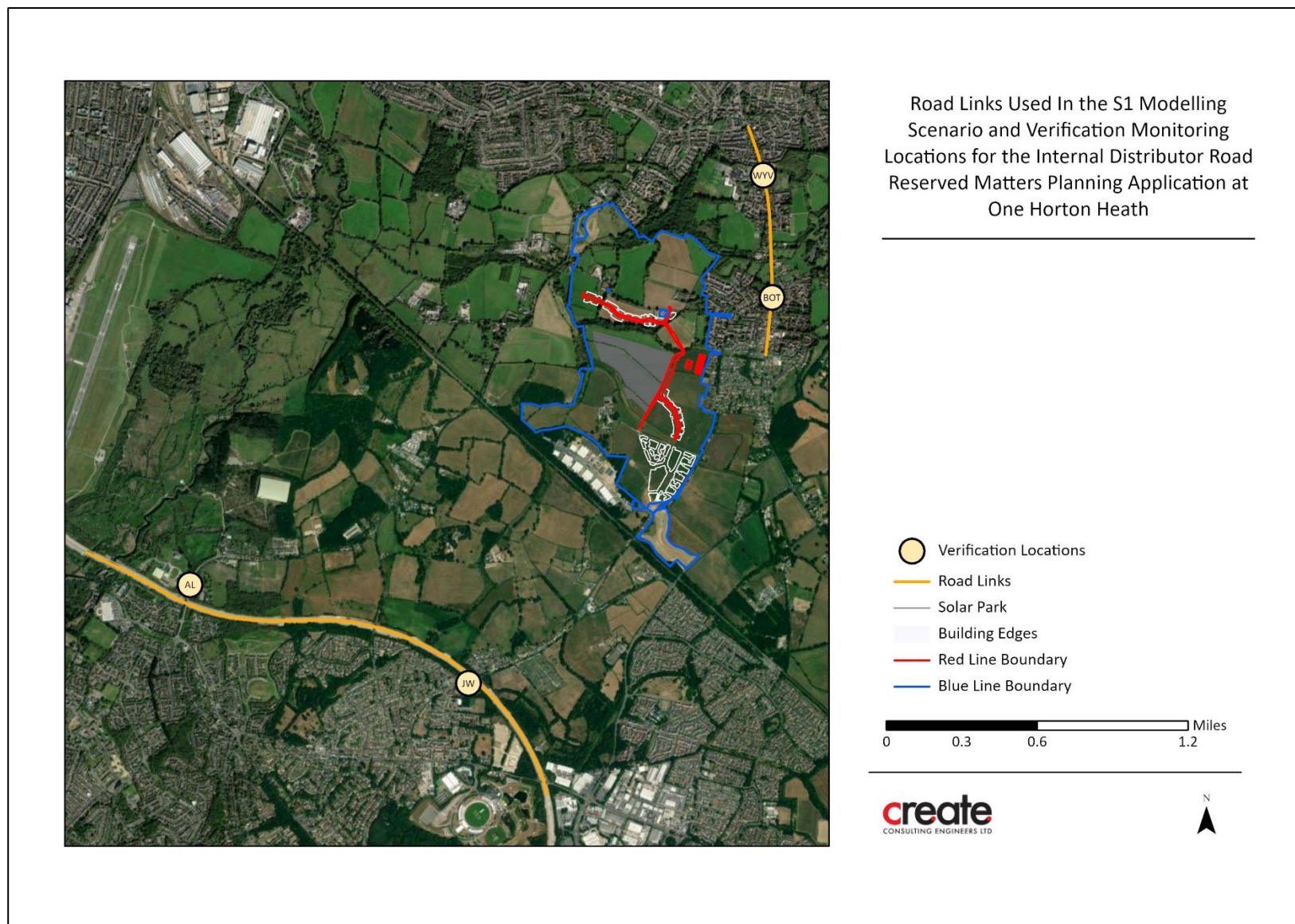


Figure 4.1: Road Links Used in the S1 Modelling Scenario and Verification Locations

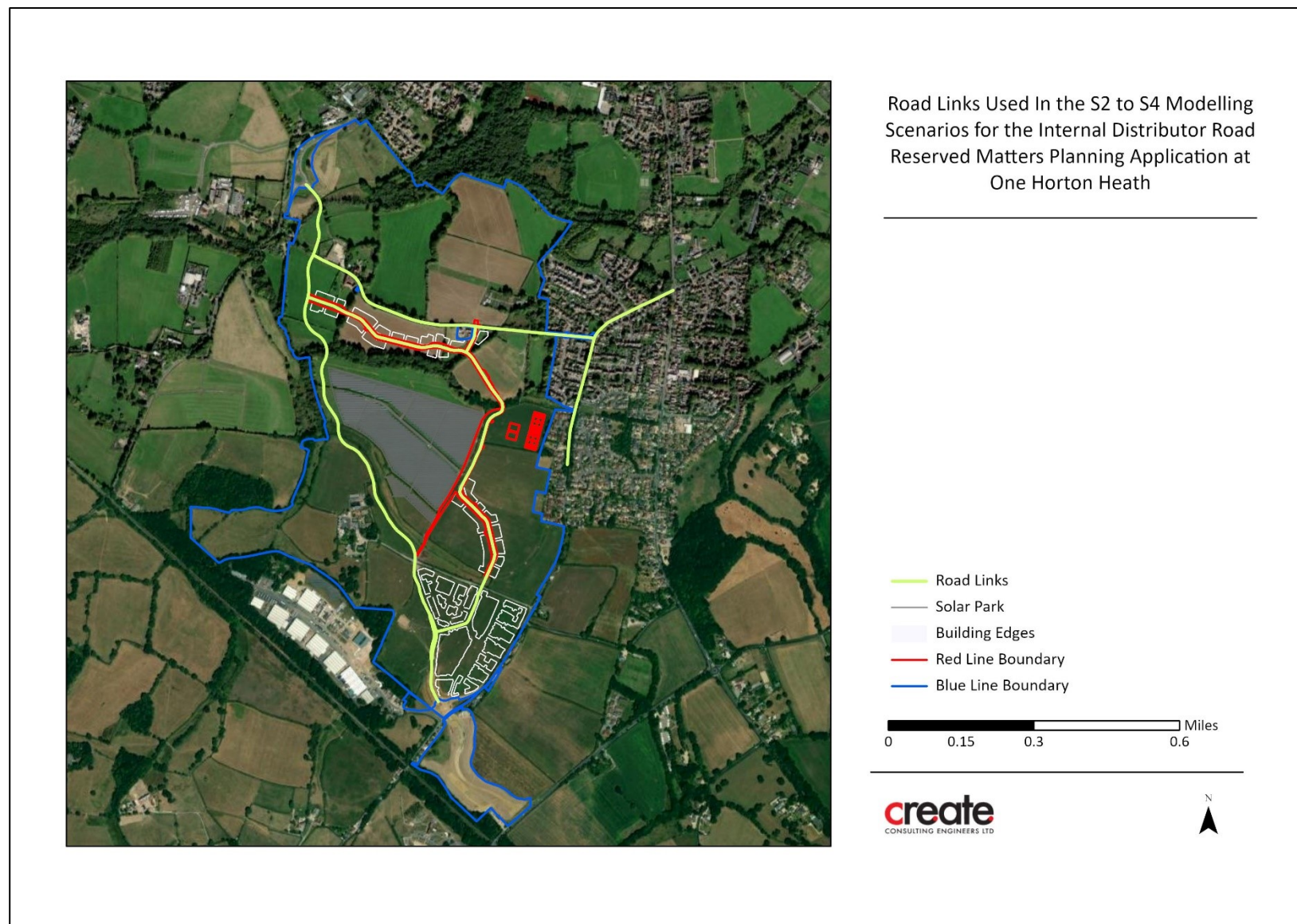


Figure 4.2: Road Links Used In the S2 to S4 Modelling Scenarios

Link ID	Road Link	Start Junction	End Junction	Average Road Width (m) for S1 to S3	Average Canyon Height (m) for S1 to S3	Average Road Width (m) for S4	Average Canyon Height (m) for S4	Mean Vehicle Speed (km/h)
L1	M27	M27, Junction 5	M27 Junction 7	58.0	15	-	-	112
L2	Botley Road (B3354)	Eastleigh Road (B3037)	Dumpers Drove	11.5	5	-	-	48
L3	Fir Tree Lane Section A	Primary Road	Access Road to Fir Tree Lane	4.0	2	4.0	2	48 - 96
L4	Fir Tree Lane Section B	Access Road to Fir Tree Lane	Burnetts Lane	4.9	10	4.9	10	48
L5	Burnetts Lane Section A	Fir Tree Lane	Botley Road	7.0	2	7.0	2	48
L6	Burnetts Lane Section B	Fir Tree Lane	Crispin Close	8.0	5	8.0	5	48
L7	Primary Road Section A	Allington Lane Roundabout	Internal Distributor Road	6.5	0	6.5	0	48
L8	Primary Road Section B	Internal Distributor Road	Internal Distributor Road Bridleway	6.5	0	6.5	0	48
L9	Primary Road Section C	Internal Distributor Road Bridleway	Internal Distributor Road	6.5	0	6.5	0	48
L10	Primary Road Section D	Internal Distributor Road	Burnetts Lane/Chalcroft Way Roundabout	6.5	0	6.5	0	48
L11	Internal Distributor Road Section A	Primary Road	Access Road to Residential Units	6.5	0	18.8	15	48
L12	Internal Distributor Road Section B	Access Road to Residential Units	Access Road to Fir Tree Lane	6.5	0	20.0	15	48

Link ID	Road Link	Start Junction	End Junction	Average Road Width (m) for S1 to S3	Average Canyon Height (m) for S1 to S3	Average Road Width (m) for S4	Average Canyon Height (m) for S4	Mean Vehicle Speed (km/h)
L13	Internal Distributor Road Section C	Access Road to Fir Tree Lane	Internal Distributor Road Bridleway	6.5	0	6.5	0	32
L14	Internal Distributor Road Section D	Internal Distributor Road Bridleway	Primary Road	6.5	0	15.6	15	48
L15	Access Road to Fir Tree Lane	Internal Distributor Road	Fir Tree Lane	6.5	0	14.5	15	48

Table 4.1: Traffic Links Used in Modelling Scenarios

Link ID	S1		S2		S3 and S4	
	24-hour AADT Flow	HDV Prop (%)	24-hour AADT Flow	HDV Prop (%)	24-hour AADT Flow	HDV Prop (%)
L1	126338	5.88	-	-	-	-
L2	13696	2.73	-	-	-	-
L3	-	-	2433	1	20	1
L4	-	-	2204	3	5420	3
L5	-	-	3915	3	6759	3
L6	-	-	3116	3	3216	3
L7	-	-	0	0	11045	5
L8	-	-	0	0	10380	5
L9	-	-	0	0	10081	5
L10	-	-	0	0	10527	5
L11	-	-	0	0	6131	3
L12	-	-	0	0	3985	3
L13	-	-	0	0	2310	3

Link ID	S1		S2		S3 and S4	
	24-hour AADT Flow	HDV Prop (%)	24-hour AADT Flow	HDV Prop (%)	24-hour AADT Flow	HDV Prop (%)
L14	-	-	0	0	3609	3
L15	-	-	0	0	7566	3

Table 4.2: Traffic Data Input into Modelling Scenarios

- 4.12 A 2019 national diurnal profile was added to all scenarios to evaluate the distribution of traffic across the week within the model. A representation of the profile is shown in Figure 4.3.

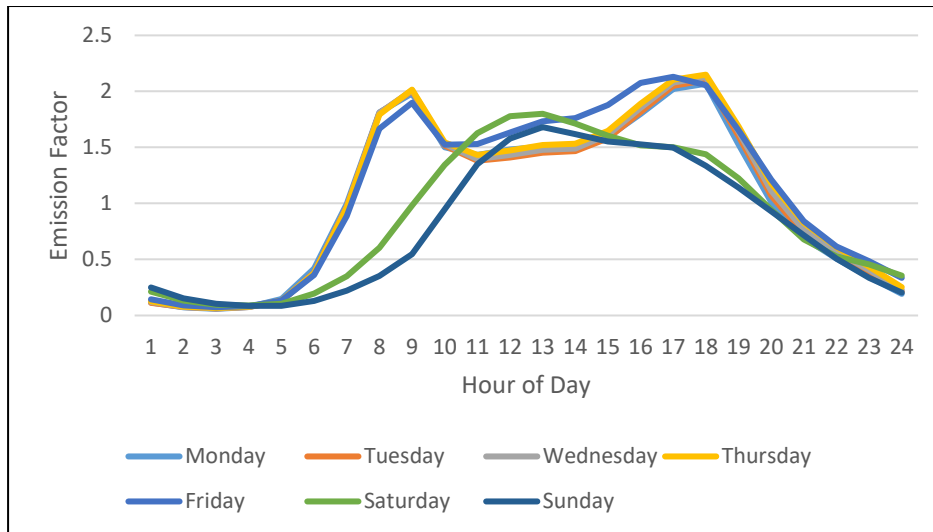


Figure 4.3: 2019 National Diurnal Profile

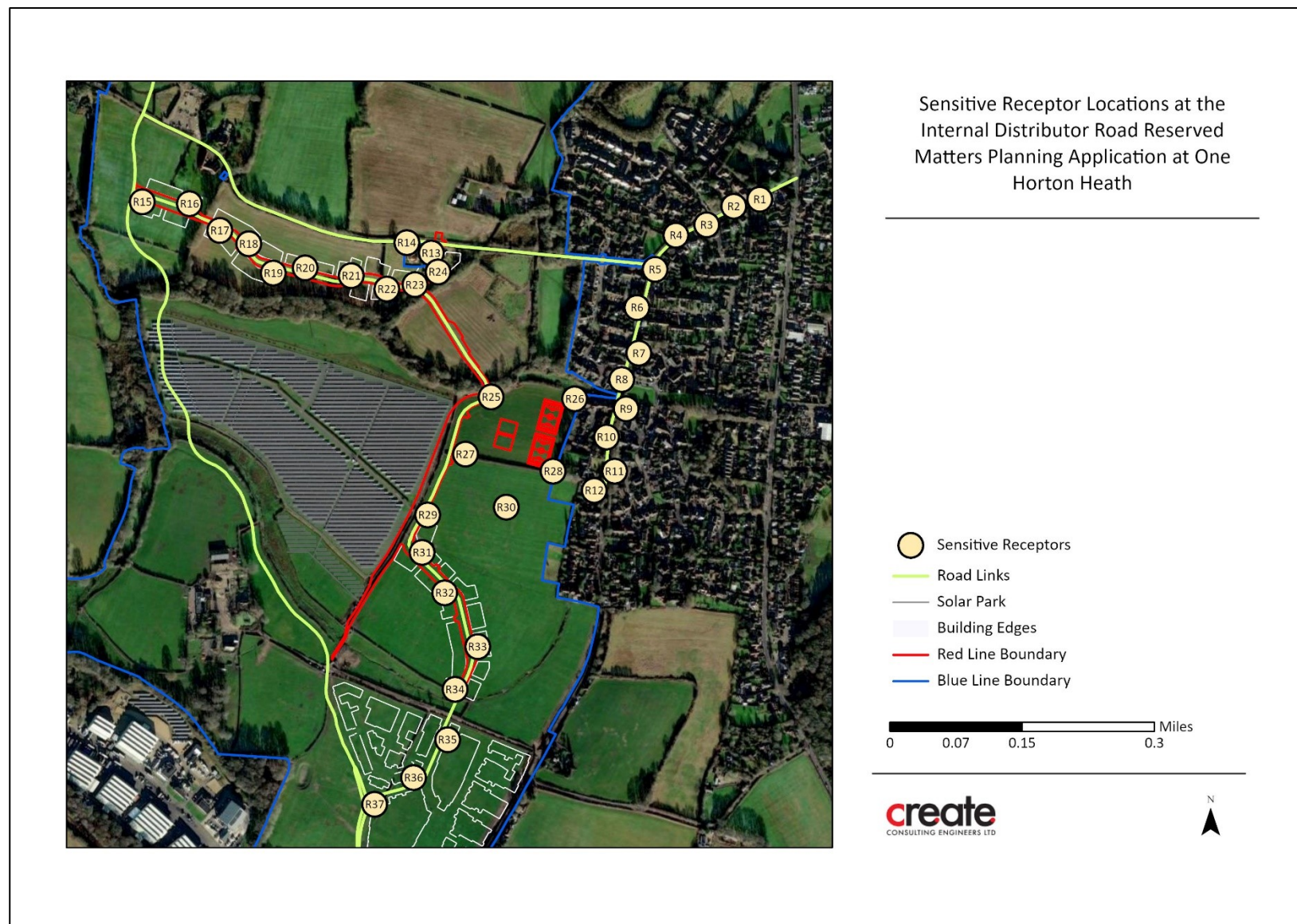
Sensitive Receptors

- 4.13 Sensitive receptors were identified within close proximity of the road links modelled and the proposed development as shown in Table 4.3 and Figure 4.4. These were modelled at a height of 1.5 m, to represent receptors at ground level.

Receptor ID	Location	NGR (m)	
		X- Axis	Y-Axis
R1	Fairways, Burnetts Lane	449565	117383
R2	1 Saxon Court	449517	117370
R3	Jem, The Lillies	449468	117336
R4	Chapel Drove	449412	117317
R5	West Dene, Burnetts Lane	449374	117255
R6	28 Angelica Gardens	449341	117185
R7	10 Centaury Gardens	449344	117102
R8	25 Angelica Gardens	449312	117054
R9	10 Rosebury Close	449321	117000
R10	4 Bramley Gardens	449285	116949
R11	25 Bryony Gardens	449299	116886
R12	8 Crispin Close	449263	116852
R13	Existing Receptor on Fir Tree Lane	448965	117285
R14	Existing Receptor on Fir Tree Lane	117285	117304
R15	Internal Distributor Road - Receptor 1	448438	117378
R16	Internal Distributor Road - Receptor 2	448524	117375
R17	Internal Distributor Road - Receptor 3	448579	117326
R18	Internal Distributor Road - Receptor 4	448632	117301

Receptor ID	Location	NGR (m)	
		X- Axis	Y-Axis
R19	Internal Distributor Road - Receptor 5	448677	117248
R20	Internal Distributor Road - Receptor 6	448735	117258
R21	Internal Distributor Road - Receptor 7	448819	117243
R22	Internal Distributor Road - Receptor 8	448884	117219
R23	Internal Distributor Road - Receptor 9	448935	117227
R24	Internal Distributor Road - Receptor 10	448977	117250
R25	Internal Distributor Road - Receptor 11 (School)	449074	117022
R26	Internal Distributor Road - Receptor 12 (School)	449227	117019
R27	Internal Distributor Road - Receptor 13 (School)	449027	116917
R28	Internal Distributor Road - Receptor 14 (School)	449187	116887
R29	Internal Distributor Road - Receptor 15 (Sports Pitch)	448959	116807
R30	Internal Distributor Road - Receptor 16 (Sports Pitch)	449102	116821
R31	Internal Distributor Road - Receptor 17	448948	116738
R32	Internal Distributor Road - Receptor 18	448989	116665
R33	Internal Distributor Road - Receptor 19	449049	116566
R34	Internal Distributor Road - Receptor 20	449008	116488
R35	Internal Distributor Road - Receptor 21	448995	116396
R36	Internal Distributor Road - Receptor 22	448933	116327
R37	Internal Distributor Road - Receptor 23	448862	116278

Table 4.3: Sensitive Receptor Locations

**Figure 4.4: Sensitive Receptor Locations**

Meteorological Data

- 4.14 Meteorological data used in this assessment was taken from Southampton Airport (SOU) meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive) as shown in Figure 4.5. SOU meteorological station is located approximately 2.5 km west of the proposed development site.
- 4.15 All meteorological records used in the assessment were provided by Air Pollution Services Ltd, which is an established distributor of data within the UK.

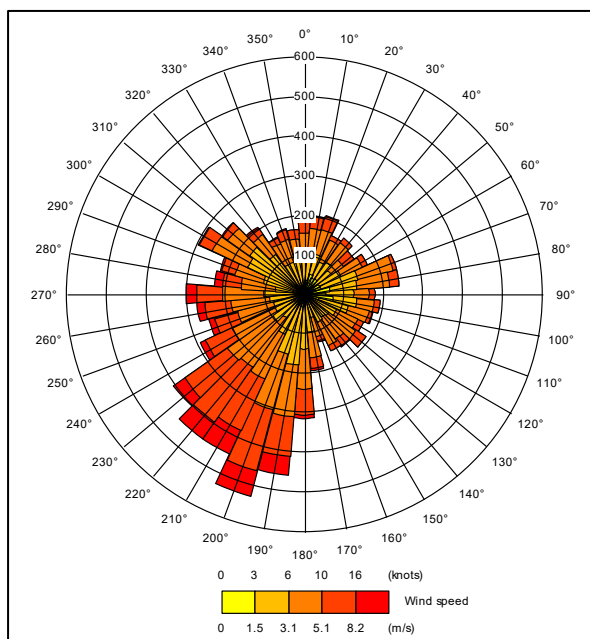


Figure 4.5: Wind Rose for SOU Meteorological Station Data 2019

Roughness Length

- 4.16 A roughness length (z_0) of 1 m was used for the dispersion site. This value is considered appropriate for the morphology of the assessment area and the meteorological site and is suggested within ADMS-Roads Extra as being suitable for 'cities and woodlands'.

Monin-Obukhov Length

- 4.17 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 10 m was used for the assessment area for the dispersion site. This value is considered appropriate for the nature of the assessment area at the dispersion site and is suggested within ADMS-Roads Extra as being suitable for 'small towns <50,000'.
- 4.18 A minimum Monin-Obukhov length of 30 m was used in the assessment area for the meteorological site. This value is considered appropriate for the nature of the assessment area at the dispersion site and the meteorological station and is suggested within ADMS-Roads Extra as being suitable for 'cities and large towns'.

Background Concentrations

- 4.19 The background monitoring location, HG, has been used to provide 2019 annual background concentrations for NO₂ within the model. This monitoring station is run by EBC.
- 4.20 There are no suitable background monitoring stations for PM₁₀ and PM_{2.5} within the area. Therefore, DEFRA background map figures have been used, by averaging the four grid squares, illustrated in Table 3.3.
- 4.21 Concentrations used within the model are as follows:
- NO₂ annual concentration of 17.1 µg/m³;
 - PM₁₀ annual concentration of 13.70 µg/m³; and
 - PM_{2.5} annual concentration of 9.45 µg/m³.
- 4.22 Background concentrations for 2019 were utilised in preference to the development's future year scenario, 2030. This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operational phase of the proposals.

Verification

- 4.23 The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations.
- 4.24 The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:
- Estimates of background concentrations;
 - Uncertainties in source activity data such as traffic flows and emission factors;
 - Variations in meteorological conditions;
 - Overall model limitations; and
 - Uncertainties associated with monitoring data, including locations
- 4.25 For the purpose of this assessment the model verification was undertaken for 2019, using traffic data, meteorological data and background concentrations from this year. Several monitoring locations were used within the modelled road network to provide a broad area to verify the model against.
- 4.26 The monitored and modelled road contribution concentrations for NO₂ was graphed and the equation of the trendline based on the linear progression through zero was calculated. The results for predicted versus monitored NO₂ concentrations are shown in Figure 4.6.

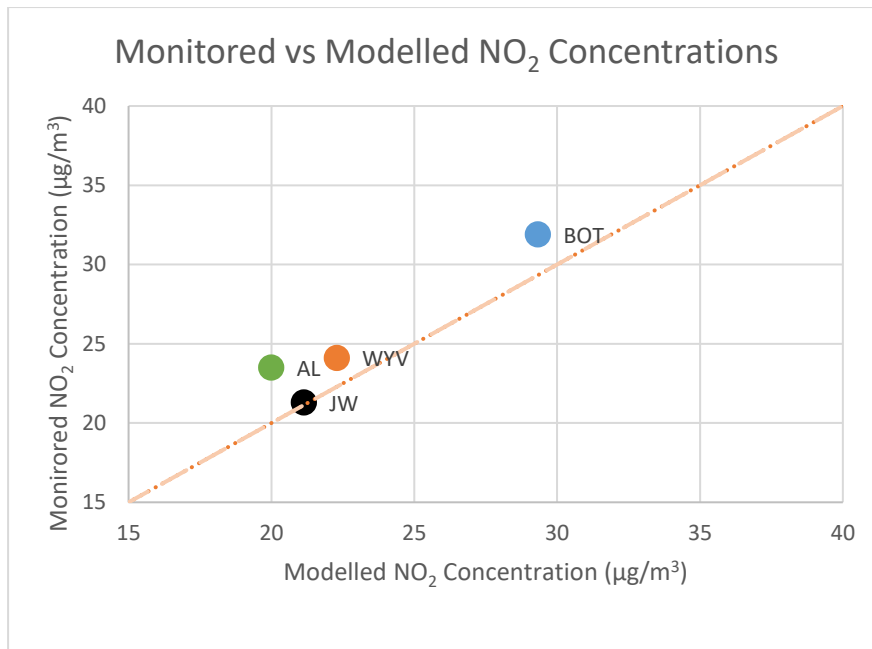


Figure 4.6: Monitored vs Modelled NO₂ Concentrations

Verification Factor for NO₂

- 4.27 The results in Figure 4.6 show that the modelled annual predicted NO₂ concentrations, do not align with the monitored annual concentration at BOT, AL and WYV. JW aligns closely with the monitored data. Overall, the model is underpredicting. Based on the information available, a verification factor has been added to the modelling scenarios for NO₂.
- 4.28 Table 4.4 shows the predicted NO₂ concentration at the monitoring location.

Site ID	Monitored Road NO ₂ Concentration (µg/m ³)	Modelled Road NO ₂ Concentration (µg/m ³)	Difference (%)
BOT	31.90	29.33	-8.04
WYV	24.10	22.29	-7.50
JW	21.30	21.14	-0.73
AL	23.50	20.00	-14.89
Overall Difference			-7.79

Table 4.4: Modelled NO₂ Concentrations

- 4.29 Figure 4.6 and Table 4.3 show that there is an overall 7.79% difference between the monitored and modelled data at the combined monitoring locations. This indicated a NO₂ verification factor of 1.08772 was required to correct and align the underprediction of the model.
- 4.30 Table 4.5 presents the adjusted modelled NO₂ concentration using the verification factor.

Site ID	Monitored NO ₂ Concentration (µg/m ³)	Adjusted Modelled Total NO ₂ Concentration (µg/m ³)	Difference (%)
BOT	31.90	31.91	0.02
WYV	24.10	24.25	0.61
JW	21.30	23.00	7.97
AL	23.50	21.76	-7.42
Overall Difference			0.30

Table 4.5: Adjusted Modelled NO₂ Concentrations

- 4.31 Table 4.5 shows that the addition of the verification factor creates a 0.3% difference between the monitored and modelled data at the combined monitoring locations. Therefore, the modelled dispersion area closely represents the actual area.

Verification Factor for PM₁₀ and PM_{2.5}

- 4.32 There are no monitoring stations that monitor PM₁₀ and PM_{2.5} concentrations within the vicinity of the proposed development and therefore these pollutants were not modelled in the baseline modelling scenario.
- 4.33 As a result, a factor of 1.08772 was derived from the NO₂ verification factor and utilised to adjust model predictions for PM₁₀ and PM_{2.5}, in accordance with the guidance provided within LAQM.TG22.

5.0 CONSTRUCTION PHASE ASSESSMENT

- 5.1 There is the potential for air quality impacts as a result of the construction and operation of the proposed development. These have been assessed in line with the IAQM's '*Guidance on the assessment of dust from demolition and construction*'.

Sensitive Receptors

- 5.2 A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for construction dust impacts in the following Sections.
- 5.3 Receptors consist of the neighbouring towns of Horton Heath, adjacent to the eastern boundary of One Horton Heath, and several retained properties over the One Horton Heath and the application area.
- 5.4 Based on the criteria shown in Table A2, Appendix A, the sensitivity of the receiving environment to potential dust impacts was considered to be **high**. This was because users would expect to enjoy a high level of amenity.
- 5.5 There are also commercial receptors at Chalfort Business Park, located to the southern boundary of One Horton Heath and varying commercial units surrounding the application area.
- 5.6 Based on the criteria shown in Table A2, Appendix A, the sensitivity of commercial receptors to potential dust impacts was considered to be **medium**. This was because users would expect to enjoy a reasonable level of amenity.
- 5.7 Ecological receptors were analysed using Magic Maps website which provides authoritative geographic information about the natural environment from across government. This application is managed by Natural England.
- 5.8 The review showed that the Internal Distributor Road is located approximately 1.2 km east of River Itchen Site of Special Scientific Interest (SSSI) and approximately 1.5 km north of Moorgreen Meadows SSSI. These SSSI's are more than 50 m away from the proposed development and have therefore been screened out.
- 5.9 Due the proximity of the SSSI's, the Internal Distributor Road runs through several SSSI Impact Risk Zones (IRZs). As a result, these SSSI IRZs require assessing for planning applications, and therefore construction activities have the potential to impact the ecological receptor.

Construction and Trackout Sensitive Receptors

- 5.10 Receptors sensitive to potential dust impacts during earthworks and construction periods were identified from a desk-top study of the area up to 350 m from the development boundary. These are summarised in Table 5.1.

Distance from Site Boundary (m)	Approximate Number of High Sensitivity Receptors	Approximate Number of Medium Sensitivity Receptors	Approximate Number of Ecological Receptors
Less than 20	1 – 10	0	1
Less than 50	1 – 10	0	1
Less than 100	1 – 10	0	-
Less than 350	More than 100	10 -100	-

Table 5.1: Construction Activities Dust Sensitive Receptors

- 5.11 Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50 m from the road network within 500 m of the site access routes. These are summarised in Table 5.2.
- 5.12 The exact construction vehicle access routes are not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor.
- 5.13 It is assumed that the Primary Road, within the One Horton Heath masterplan, will be constructed first. Therefore, it is expected that access would be made via the northern or southern links of the Primary Road and via Fir Tree Lane from Burnetts Lane.

Distance from Site Access Route (m)	Approximate Number of High Sensitivity Receptors	Approximate Number of Medium Sensitivity Receptors	Approximate Number of Ecological Receptors
Less than 20	10 – 100	1 – 10	1
Less than 50	10 – 100	1 – 10	1

Table 5.2: Trackout Activities Dust Sensitive Receptors

Additional Factors

- 5.14 A review of the EBC planning portal indicated that there are no major developments taking place within 500 m of the site boundary, excluding the phased development of One Horton Heath.
- 5.15 The wind direction is predominantly south westerly, as shown in Figure 4.5. As such, receptors to the northeast of the site would be most affected by dust emissions.

Sensitivity of the Surrounding Area

- 5.16 Sensitive receptors have been assessed based on distance from source and annual mean concentrations of PM₁₀ in the area to determine the sensitivity of the surrounding area to earthworks, construction and trackout activities.
- 5.17 Table 5.3 shows the sensitivity of the surrounding area in relation to dust soiling, human health and ecological impacts for each of the construction activities.

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

Table 5.3: Sensitivity of the Surrounding Area

Construction Phase Assessment

- 5.18 The undertaking of activities such as 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 haul road and highway surfaces.
- 5.19 The potential for impacts at sensitive locations 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.
- 5.20 The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350 m of the site boundary. As such, a detailed assessment of potential dust impacts was required.
- 5.21 The development is likely to take place on a phased approach, however for the basis of this assessment, the development has been assessed as a whole package. There is currently no data available on the construction-based activities. Therefore, professional judgement has been used to assess each activity.

Assessment of Potential Dust Emission Magnitude

- 5.22 The IAQM assessment methodology has been used to determine the potential dust emission

magnitude for the construction activities, as shown in Appendix A.

Demolition

- 5.23 No Demolition works will be taking place along the Internal Distributor Road route. Therefore, this has not been assessed any further.

Earthworks

- 5.24 Earthworks will primarily involve excavating material, haulage, as well as site levelling and landscaping. The British Geological Survey website informs that the soil type beneath the site is Wittering Formation consisting of sand, silt and clay. The total area of the site is more than 10,000 m².
- 5.25 Due to the size of the site area, it is expected there will be more than 10 HGVs active at any one time. Material moved is likely to be between 25,000 to 100,000 tonnes. In accordance with the criteria outlined in Table A1, the magnitude of potential dust emissions from earthworks is therefore **large**.

Construction

- 5.26 The building volume of the road is likely to be between 25,000 to 100,000 m³. A mixture of materials will be used to build the road such as tarmac with mineral aggregates like cement, sand, gravel or concrete. Due to the size of the site, it is expected that on-site concrete batching and/or sandblasting may take place. In accordance with the criteria outlined in Table A1, the magnitude of potential dust emissions from construction is therefore **large**.

Trackout

- 5.27 Trackout activities will include vehicles accessing and leaving the site. Unpaved road is expected to be more than 100 m with sand, silt and clay material picked up by vehicles. The number of HGV movements per day is likely to be more than 50 movements. In accordance with the criteria outlined in Table A1, the magnitude of potential dust emissions from Trackout is therefore **large**.

Risk of Impacts

- 5.28 The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. Table 5.4 provides a summary of the risk of impacts for the proposed development. The highest risk category identified for each construction activity has been used to determine the level of mitigation required.

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

Table 5.4: Summary of Potential Unmitigated Dust Risks

- 5.29 As indicated in Table 5.4, the highest risk for dust generating activities during earthworks, construction is a medium risk, and a high risk for trackout. The overall dust risk level is classed as a high risk for all non-specified activities not listed in Table 5.5.
- 5.30 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 phases.

Mitigation and Residual Effects

- 5.31 The IAQM guidance provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the development site as summarised in Table 5.5.
- 5.32 The mitigation measures can be reviewed prior to the commencement of construction works incorporated into the existing strategies as applicable.
- 5.33 Assuming the relevant mitigation measures outlined in Table 5.5 are implemented, the residual effect from all dust generating activities is predicted to be not significant, in accordance with the IAQM guidance.

Guidance	Comment
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 DMP, which may include measures to control other emissions, approved by the Local Authority.

Guidance	Comment
Site Management	- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. - Make the complaints log available to the local authority when asked. - Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.
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. - 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 PM₁₀ continuous monitoring locations with the Local Authority, specifically for Demolition activities. 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.
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 active 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.

Guidance	Comment
Operating Vehicle/ Machinery and Sustainable Travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles. • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. • Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas. • Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. • Implement a Travel Plan that supports and encourages sustainable travel.
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 spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	• Avoid bonfires and burning of waste materials.
Earthworks	• Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. • Only remove and cover in small areas during works and not all at once.
Construction	• Avoid scabbling (roughening of concrete surfaces) if possible. • 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. • 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. • For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Guidance	Comment
Trackout	• 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. • Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. • Record all inspections of haul routes and any subsequent action in a site log book. • 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.

Table 5.5: Fugitive Dust Mitigation Measures

6.0 DISPERSION MODELLING ASSESSMENT

6.1 A dispersion modelling assessment has been undertaken to determine annual concentrations of NO₂, PM₁₀ and PM_{2.5} at the proposed development for the following scenarios:

- Future year without development, 2030 (S2);
- Future year with the development and no canyons, 2030 (S3); and
- Future year with the development and canyons, 2030 (S4).

6.2 Sensitive receptor locations were modelled at a height of 1.5 m to represent ground floor height.

Nitrogen Dioxide (NO₂) Impacts

6.3 The modelled results of all future year scenarios for predicted annual NO₂ concentrations are shown in in Figures 6.1 to 6.3. Results show that predicted annual NO₂ concentrations are not expected to exceed the AQO of 40 µg/m³ across the site boundary in 2030 for any future year scenario.

6.4 It should also be noted that predicted annual NO₂ concentrations are likely to be lower at elevated heights due to increased distance from emission sources, such as the local road network. Therefore, predicted concentrations at heights above ground floor level are considered to be acceptable in regard to pollutant exposure and have not been assessed further.

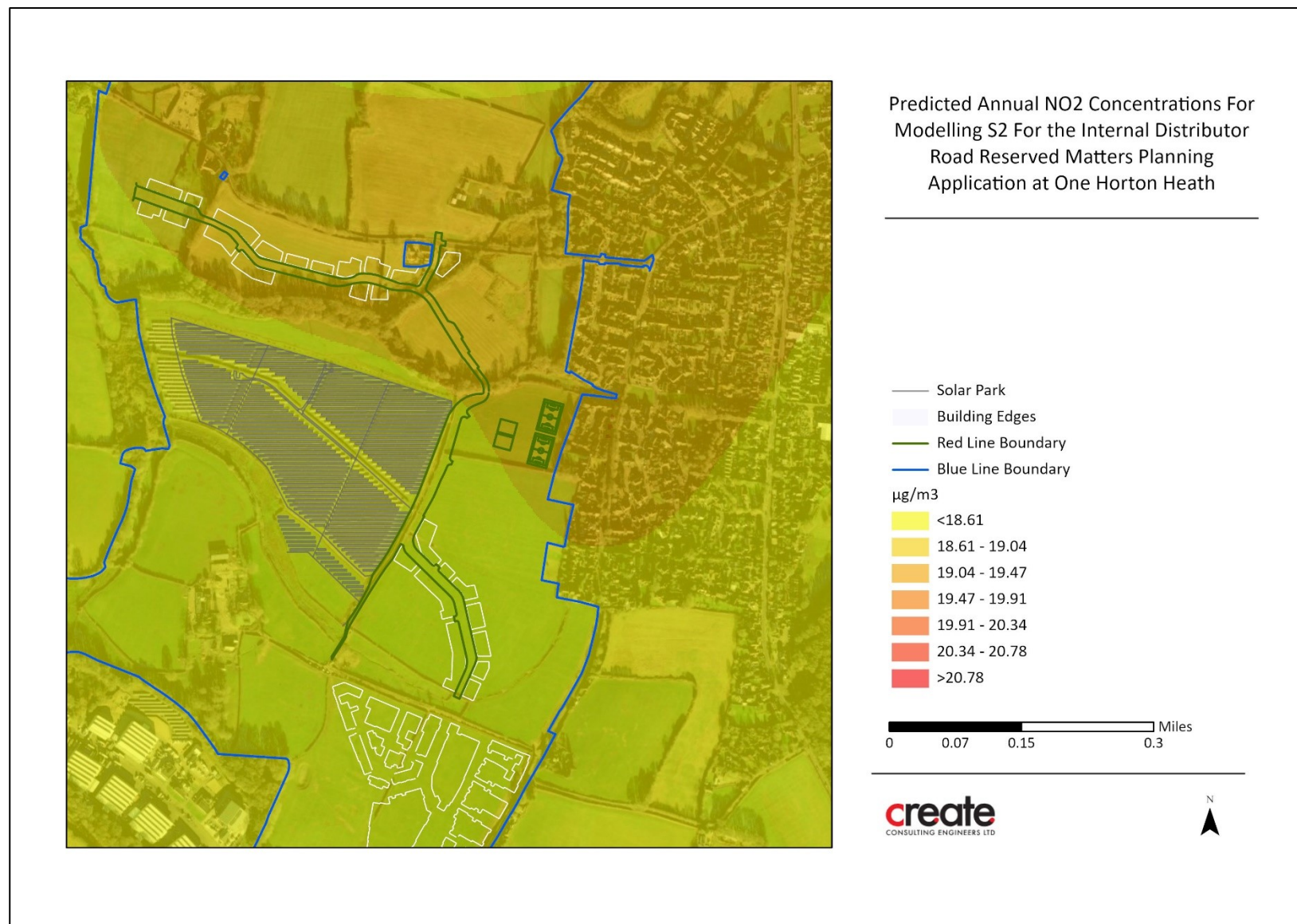


Figure 6.1: Predicted Annual NO₂ Concentrations for the S2

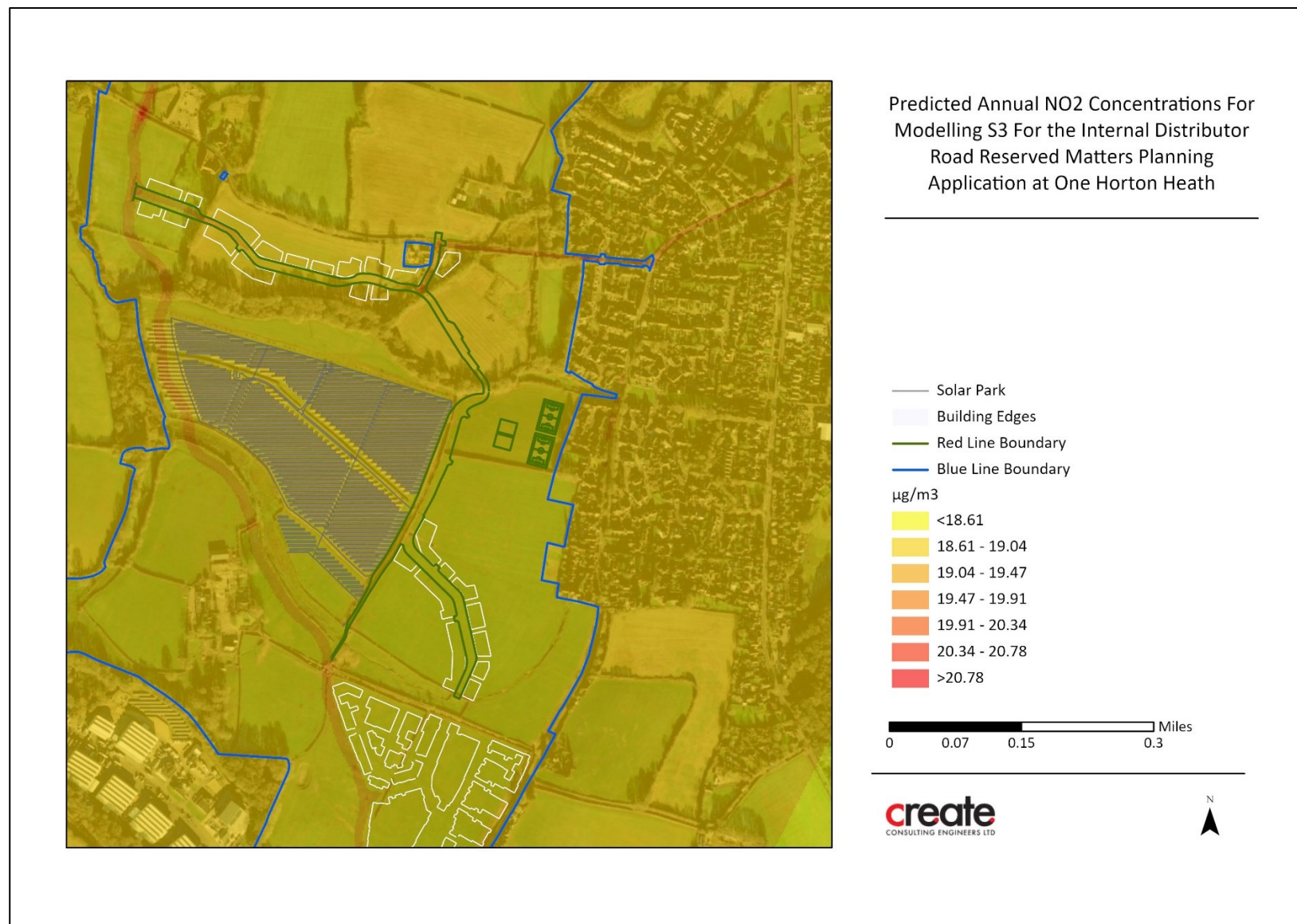


Figure 6.2: Predicted Annual NO₂ Concentrations for the S3

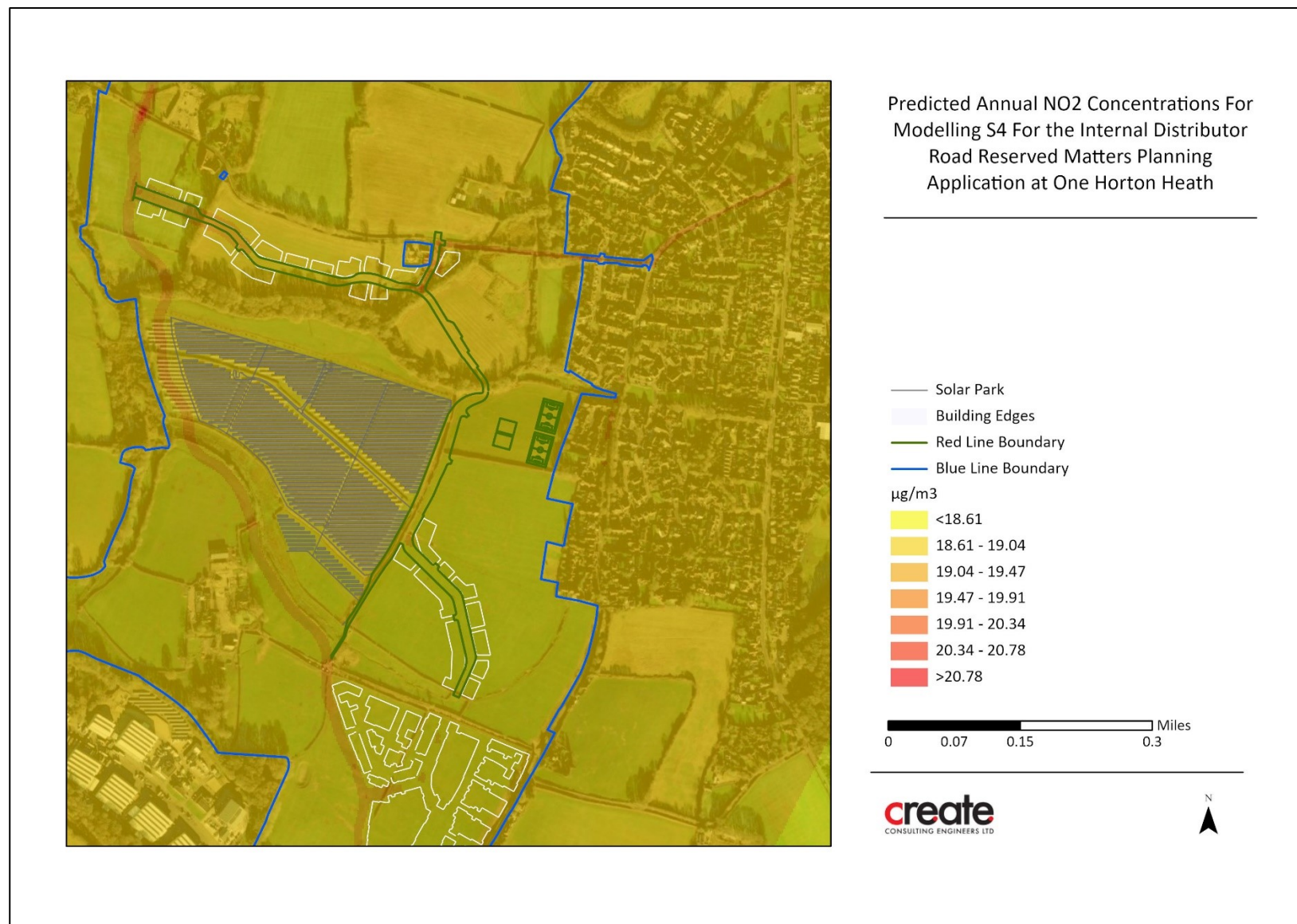


Figure 6.3: Predicted Annual NO₂ Concentrations for the S4

6.5 In accordance with the assessment criteria the annual NO₂ concentrations were predicted for S2, S3 and S4 scenarios at various sensitive receptor locations. The predicted annual NO₂ concentrations and changes between the scenarios are summarised in Table 6.1.

Sensitive Receptor	Predicted Annual NO ₂ Concentration (µg/m ³)					
	S2	S3	S4	Change Between S2 and S3	Change Between S2 and S4	Change Between S3 and S4
R1	18.80	18.95	18.95	0.1491	0.1492	0.00002
R2	18.88	19.09	19.09	0.2040	0.2040	0.00002
R3	18.85	19.03	19.03	0.1826	0.1826	0.00002
R4	18.87	19.07	19.07	0.1961	0.1962	0.00002
R5	18.82	18.92	18.92	0.1061	0.1061	0.00002
R6	18.71	18.74	18.74	0.0265	0.0265	0.00002
R7	18.68	18.70	18.70	0.0178	0.0178	0.00002
R8	19.02	19.05	19.05	0.0279	0.0279	0.00002
R9	18.66	18.68	18.68	0.0157	0.0158	0.00003
R10	18.76	18.78	18.78	0.0195	0.0195	0.00004
R11	18.67	18.68	18.68	0.0155	0.0155	0.00005
R12	18.64	18.65	18.65	0.0157	0.0158	0.00006
R13	18.64	18.90	18.93	0.2596	0.2873	0.02773
R14	18.75	18.68	18.68	-0.0743	-0.0743	0.00002
R15	18.61	18.95	18.98	0.3465	0.3746	0.02811
R16	18.61	18.83	18.84	0.2218	0.2290	0.00719
R17	18.61	18.85	18.88	0.2398	0.2657	0.02590
R18	18.61	18.83	18.85	0.2183	0.2336	0.01538
R19	18.61	18.73	18.75	0.1229	0.1363	0.01341
R20	18.61	18.76	18.79	0.1515	0.1762	0.02477
R21	18.61	18.78	18.94	0.1645	0.3242	0.15967
R22	18.61	18.77	18.97	0.1585	0.3597	0.20119
R23	18.61	18.94	19.10	0.3220	0.4849	0.16289
R24	18.62	18.85	18.86	0.2283	0.2427	0.01434
R25	18.61	18.70	18.70	0.0957	0.0958	0.00006
R26	18.62	18.64	18.64	0.0189	0.0189	0.00003
R27	18.60	18.66	18.66	0.0586	0.0588	0.00014
R28	18.61	18.63	18.63	0.0193	0.0193	0.00007
R29	18.60	18.72	18.73	0.1215	0.1228	0.00131
R30	18.60	18.63	18.63	0.0265	0.0265	0.00008
R31	18.60	18.77	18.75	0.1710	0.1494	-0.02166
R32	18.60	18.71	18.72	0.1060	0.1211	0.01509
R33	18.60	18.70	18.73	0.1004	0.1270	0.02662
R34	18.60	18.75	18.75	0.1453	0.1474	0.00207
R35	18.60	18.73	18.73	0.1254	0.1306	0.00521
R36	18.60	18.76	18.77	0.1588	0.1640	0.00521

Sensitive Receptor	Predicted Annual NO ₂ Concentration (µg/m ³)					
	S2	S3	S4	Change Between S2 and S3	Change Between S2 and S4	Change Between S3 and S4
R37	18.60	18.90	18.90	0.2991	0.3005	0.00145

Table 6.1: Predicted Annual NO₂ Concentrations and Differences

- 6.6 As indicated in Table 6.1, predicted annual NO₂ concentrations were below the AQO at all sensitive receptor locations and there was no significant difference in the concentrations between S3 and S4 against S2, respectively.
- 6.7 Receptor location R14 shows a decrease in predicted annual NO₂ concentrations for S3 and S4 in comparison with S2. This is due to the decrease of traffic on Fir Tree Lane, as the western road will become a bridleway with the development in place.
- 6.8 There is an increase in annual NO₂ concentrations from S3 to S4 at all sensitive receptor locations, except R31. The changes are due to the modelling of the canyon heights along the Internal Distributor Road. The changes are minimal ranging from 0.00002 to 0.20119. The decrease at R31 is expected to be due to the positioning of the buildings, creating a canyon that allows air to disperse away from the receptor.
- 6.9 Predictions of 1-hour NO₂ concentrations were not produced as part of the dispersion modelling assessment. However, as stated in LAQM.TG22 if annual mean NO₂ concentrations are below 60 µg/m³ then it is unlikely that the 1-hour AQO will be exceeded. As such, based on the results in Table 6.1, it is not predicted that concentrations will exceed the 1-hour mean AQO for NO₂ across the modelled site for the opening year, 2030, with or without canyons in place.
- 6.10 Predicted impacts on annual NO₂ concentrations in relation to the Air Quality Assessment Level (AQAL) at the sensitive receptor locations are summarised in Table 6.2 and 6.3.

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R1	0.7869	47.38	Negligible
R2	1.0686	47.72	Negligible
R3	0.9596	47.58	Negligible
R4	1.0286	47.67	Negligible
R5	0.5605	47.31	Negligible
R6	0.1412	46.85	Negligible
R7	0.0952	46.74	Negligible
R8	0.1463	47.63	Negligible
R9	0.0842	46.70	Negligible
R10	0.1036	46.95	Negligible
R11	0.0828	46.71	Negligible

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R12	0.0842	46.63	Negligible
R13	1.3731	47.26	Negligible
R14	-0.3979	46.70	Negligible
R15	1.8282	47.38	Negligible
R16	1.1777	47.08	Negligible
R17	1.2719	47.13	Negligible
R18	1.1590	47.08	Negligible
R19	0.6563	46.83	Negligible
R20	0.8072	46.91	Negligible
R21	0.8761	46.95	Negligible
R22	0.8445	46.93	Negligible
R23	1.7004	47.34	Negligible
R24	1.2114	47.12	Negligible
R25	0.5117	46.76	Negligible
R26	0.1014	46.59	Negligible
R27	0.3141	46.66	Negligible
R28	0.1034	46.57	Negligible
R29	0.6489	46.81	Negligible
R30	0.1420	46.58	Negligible
R31	0.9110	46.93	Negligible
R32	0.5665	46.77	Negligible
R33	0.5368	46.76	Negligible
R34	0.7750	46.87	Negligible
R35	0.6698	46.82	Negligible
R36	0.8464	46.90	Negligible
R37	1.5825	47.25	Negligible

Table 6.2: Predicted NO₂ Impacts for S2 and S3

- 6.11 As indicated in Table 6.2, the significance of impacts on annual NO₂ concentrations as a result of the development, without canyons, was predicted to be negligible at all receptor locations in accordance with IAQM and EPUK guidance.

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R1	0.7870	47.38	Negligible
R2	1.0687	47.72	Negligible
R3	0.9597	47.58	Negligible
R4	1.0287	47.67	Negligible
R5	0.5606	47.31	Negligible
R6	0.1413	46.85	Negligible
R7	0.0953	46.74	Negligible

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R8	0.1464	47.63	Negligible
R9	0.0844	46.70	Negligible
R10	0.1038	46.95	Negligible
R11	0.0831	46.71	Negligible
R12	0.0846	46.63	Negligible
R13	1.5175	47.33	Negligible
R14	-0.3977	46.70	Negligible
R15	1.9736	47.45	Negligible
R16	1.2155	47.10	Negligible
R17	1.4073	47.20	Negligible
R18	1.2396	47.12	Negligible
R19	0.7273	46.86	Negligible
R20	0.9380	46.97	Negligible
R21	1.7118	47.35	Negligible
R22	1.8960	47.43	Negligible
R23	2.5388	47.75	Negligible
R24	1.2865	47.16	Negligible
R25	0.5120	46.76	Negligible
R26	0.1016	46.59	Negligible
R27	0.3149	46.66	Negligible
R28	0.1038	46.57	Negligible
R29	0.6559	46.81	Negligible
R30	0.1425	46.58	Negligible
R31	0.7965	46.88	Negligible
R32	0.6466	46.81	Negligible
R33	0.6782	46.82	Negligible
R34	0.7860	46.87	Negligible
R35	0.6975	46.83	Negligible
R36	0.8740	46.91	Negligible
R37	1.5901	47.25	Negligible

Table 6.3: Predicted NO₂ Impacts for S2 and S4

- 6.12 As indicated in Table 6.3, the significance of impacts on annual NO₂ concentrations as a result of the development, with canyons, was predicted to be negligible at all receptor locations in accordance with IAQM and EPUK guidance.
- 6.13 Based on the evaluation above showing a negligible impact with the development in place for both scenarios (S3 and S4), it is considered that annual NO₂ concentrations at the development site should not be viewed as a constraint to development. Therefore, the site is considered to be suitable for the proposed use without the implementation of mitigation techniques to protect future site users from elevated NO₂ concentrations.

Particulate Matter (PM₁₀) Impacts

- 6.14 The modelled results of all future year scenarios for predicted annual PM₁₀ concentrations are shown in in Figures 6.4 to 6.6. Predicted annual PM₁₀ concentrations were not expected to exceed the AQO of 40 µg/m³ across the site boundary in 2030 for any future year scenario.
- 6.15 It should also be noted that predicted annual PM₁₀ concentrations are likely to be lower at elevated heights due to increased distance from emission sources, such as the local road network. Therefore, predicted concentrations at heights above ground floor level are considered to be acceptable in regard to pollutant exposure and have not been assessed further.

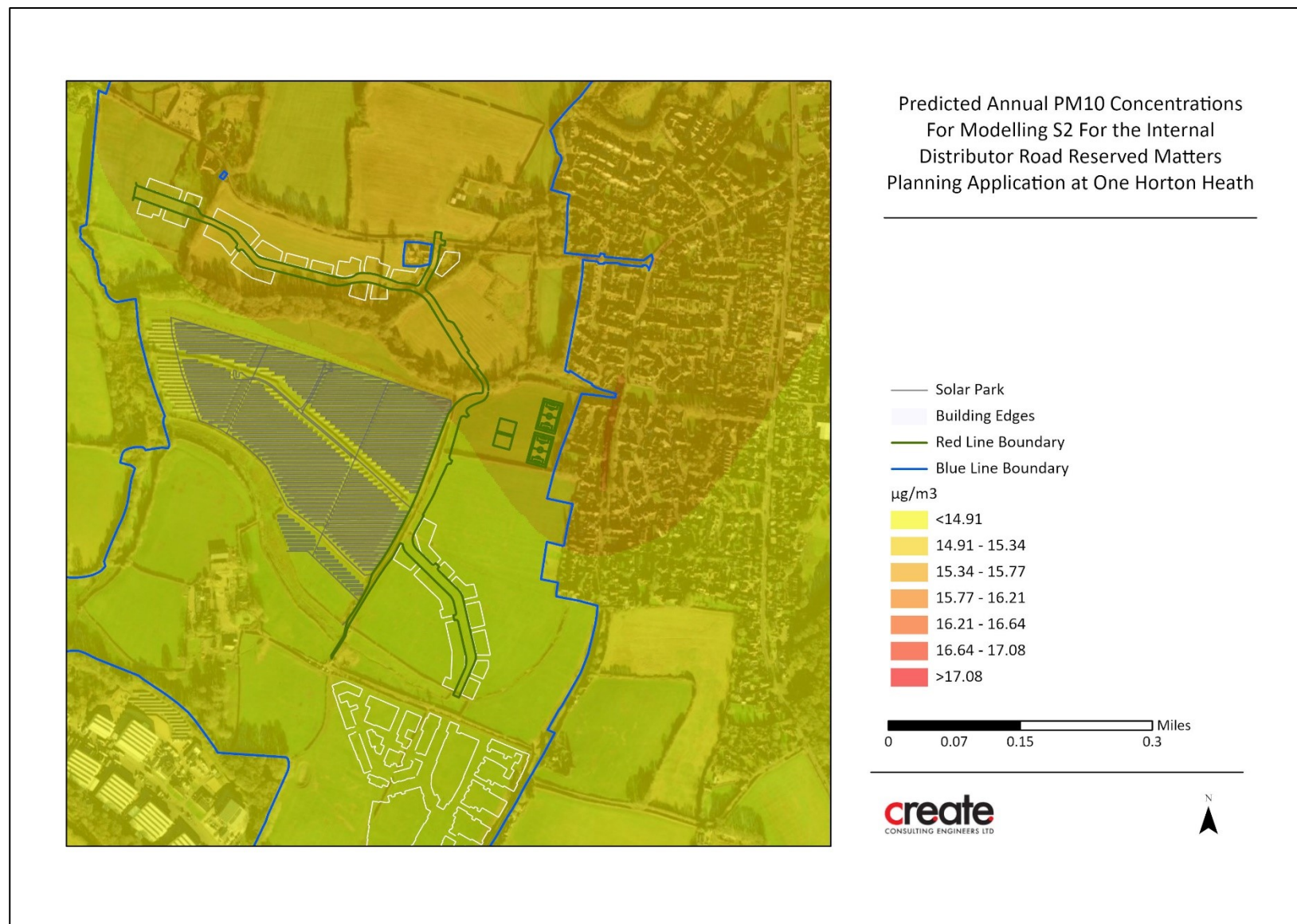


Figure 6.4: Predicted Annual PM₁₀ Concentrations for the S2 Scenario

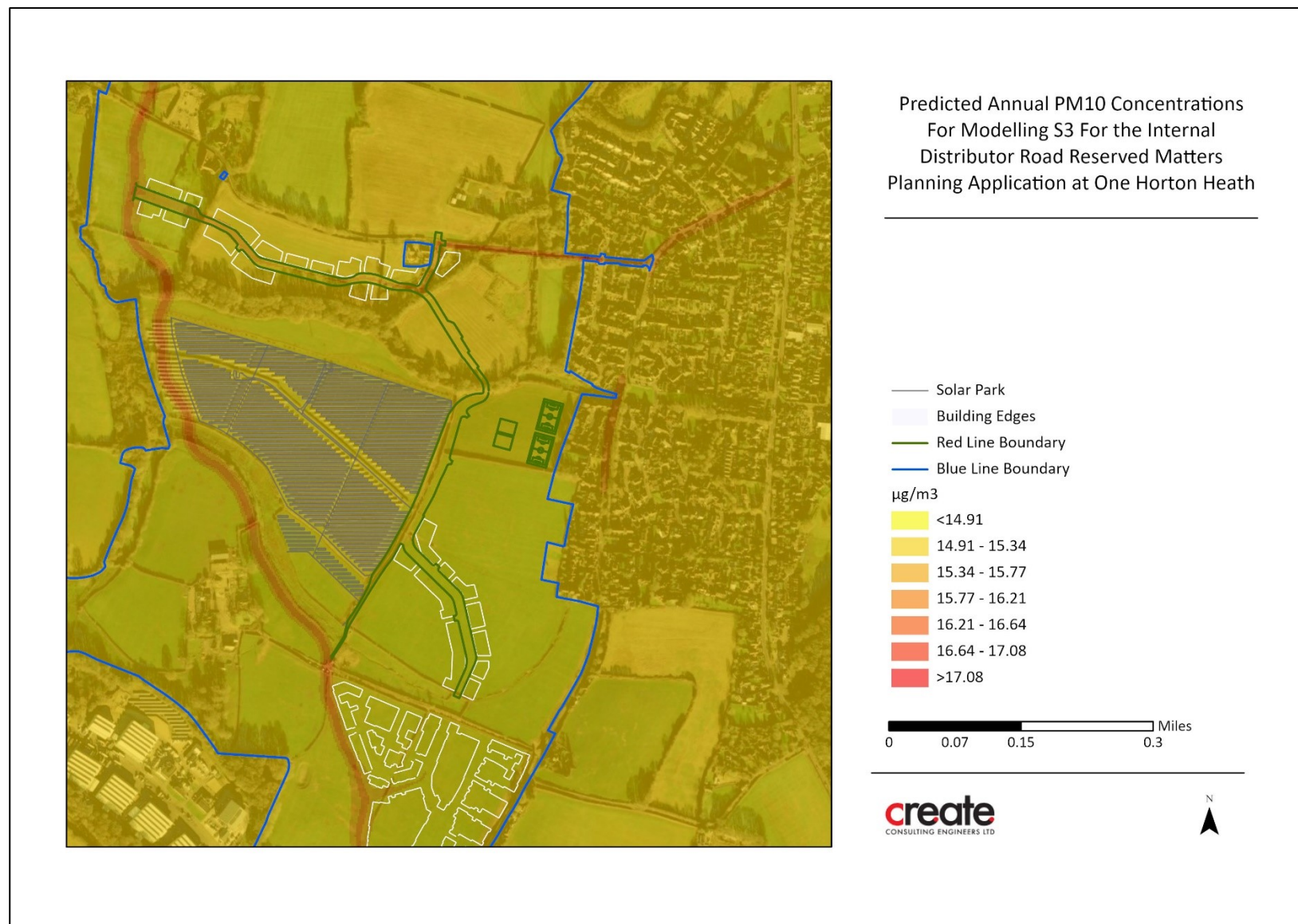


Figure 6.5: Predicted Annual PM₁₀ Concentrations for the S3 Scenario

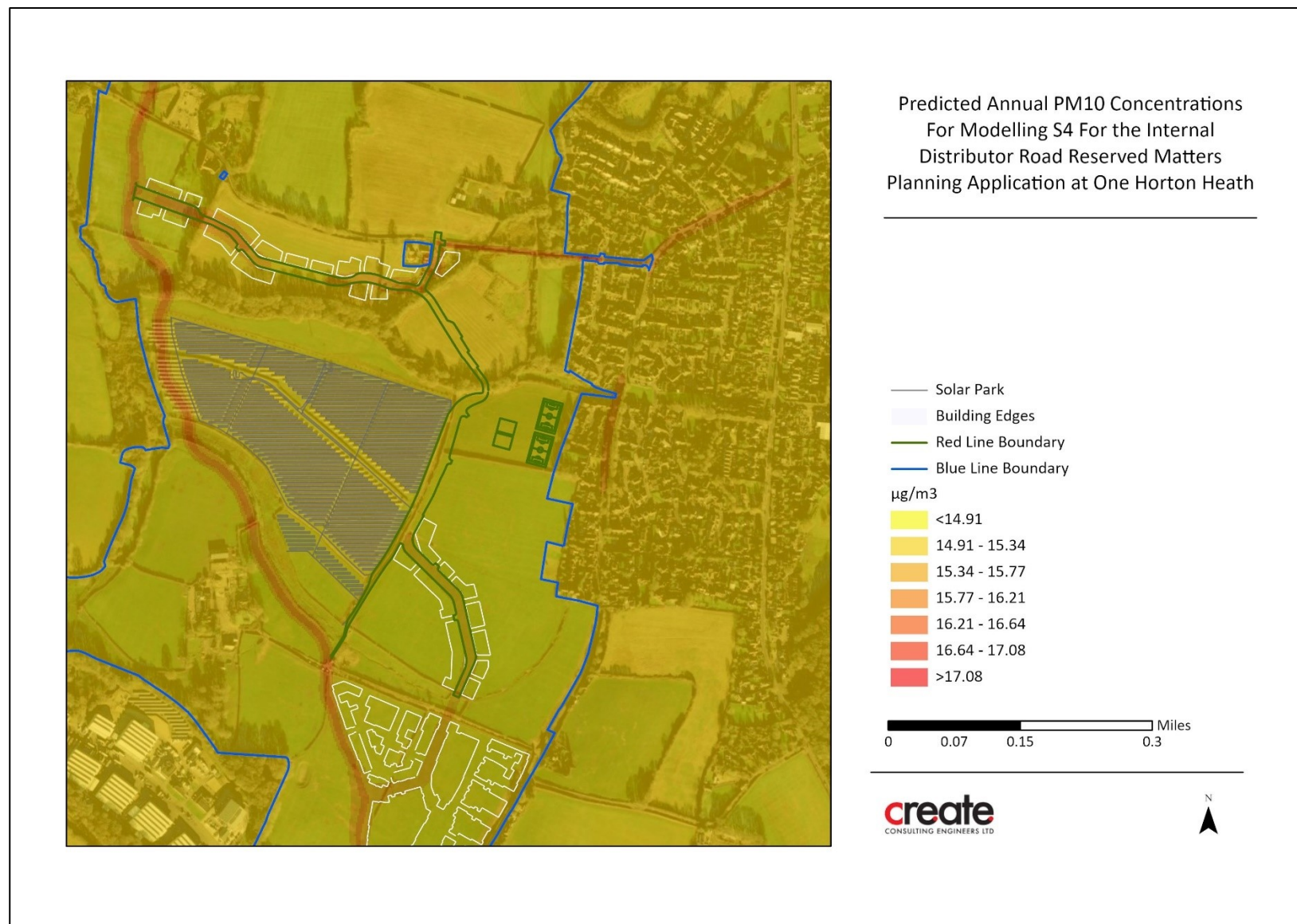


Figure 6.6: Predicted Annual PM₁₀ Concentrations for the S4 Scenario

6.16 In accordance with the assessment criteria the annual PM₁₀ concentrations were predicted for S2, S3 and S4 scenarios at various sensitive receptor locations. The predicted annual PM₁₀ concentrations and changes between the scenarios are summarised in Table 6.4.

Sensitive Receptor	Predicted Annual PM ₁₀ Concentration (µg/m ³)					
	S2	S3	S4	Change Between S2 and S3	Change Between S2 and S4	Change Between S3 and S4
R1	15.18	15.39	15.39	0.2039	0.2039	0.00002
R2	15.30	15.58	15.58	0.2811	0.2811	0.00003
R3	15.25	15.50	15.50	0.2516	0.2517	0.00003
R4	15.28	15.55	15.55	0.2689	0.2690	0.00003
R5	15.18	15.30	15.30	0.1162	0.1162	0.00003
R6	15.06	15.09	15.09	0.0348	0.0348	0.00003
R7	15.01	15.04	15.04	0.0238	0.0238	0.00003
R8	15.50	15.53	15.53	0.0366	0.0367	0.00003
R9	14.99	15.01	15.01	0.0212	0.0212	0.00004
R10	15.13	15.16	15.16	0.0260	0.0261	0.00005
R11	15.00	15.02	15.02	0.0210	0.0210	0.00007
R12	14.95	14.97	14.97	0.0215	0.0216	0.00009
R13	14.96	15.27	15.30	0.3036	0.3376	0.03402
R14	15.11	15.00	15.00	-0.1012	-0.1012	-0.00003
R15	14.91	15.36	15.39	0.4500	0.4843	0.03437
R16	14.92	15.23	15.24	0.3114	0.3215	0.01014
R17	14.92	15.26	15.29	0.3388	0.3753	0.03649
R18	14.92	15.23	15.25	0.3083	0.3300	0.02167
R19	14.91	15.09	15.11	0.1733	0.1921	0.01883
R20	14.92	15.13	15.17	0.2129	0.2477	0.03479
R21	14.92	15.15	15.38	0.2296	0.4538	0.22421
R22	14.92	15.13	15.42	0.2156	0.4982	0.28252
R23	14.92	15.30	15.53	0.3797	0.6085	0.22875
R24	14.93	15.22	15.24	0.2897	0.3097	0.02007
R25	14.91	15.03	15.03	0.1201	0.1202	0.00009
R26	14.93	14.95	14.95	0.0254	0.0255	0.00004
R27	14.91	14.98	14.98	0.0758	0.0760	0.00020
R28	14.92	14.94	14.94	0.0263	0.0264	0.00010
R29	14.91	15.06	15.06	0.1560	0.1578	0.00185
R30	14.91	14.94	14.94	0.0364	0.0365	0.00012
R31	14.90	15.15	15.11	0.2405	0.2098	-0.03069
R32	14.90	15.05	15.08	0.1500	0.1714	0.02138
R33	14.90	15.05	15.08	0.1422	0.1799	0.03772
R34	14.90	15.11	15.11	0.2060	0.2089	0.00293
R35	14.90	15.08	15.09	0.1776	0.1850	0.00738
R36	14.90	15.13	15.13	0.2236	0.2310	0.00741

Sensitive Receptor	Predicted Annual PM ₁₀ Concentration (µg/m ³)					
	S2	S3	S4	Change Between S2 and S3	Change Between S2 and S4	Change Between S3 and S4
R37	14.90	15.30	15.30	0.3978	0.3996	0.00175

Table 6.4: Predicted Annual PM₁₀ Concentrations and Differences

- 6.17 As indicated in Table 6.4, predicted annual PM₁₀ concentrations were below the AQO at all sensitive receptor locations and there was no significant difference in the concentrations between S3 and S4 against S2, respectively.
- 6.18 Receptor location R14 shows a decrease in predicted annual PM₁₀ concentrations for S3 and S4 in comparison with S2. This is due to the decrease of traffic on Fir Tree Lane, as the western road will become a bridleway with the development in place.
- 6.19 There is an increase in annual PM₁₀ concentrations from S3 to S4 at all sensitive receptor locations, except R31. The changes are due to the modelling of the canyon heights along the Internal Distributor Road. The changes are minimal ranging from 0.00002 to 0.28252. The decrease at R31 is expected to be due to the positioning of the buildings, creating a canyon that allows air to disperse away from the receptor.
- 6.20 Predicted impacts on annual PM₁₀ concentrations in relation to the AQAL at the sensitive receptor locations are summarised in Table 6.5 and 6.6.

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R1	1.3247	38.47	Negligible
R2	1.8042	38.95	Negligible
R3	1.6231	38.76	Negligible
R4	1.7293	38.88	Negligible
R5	0.7592	38.25	Negligible
R6	0.2304	37.73	Negligible
R7	0.1580	37.59	Negligible
R8	0.2358	38.84	Negligible
R9	0.1409	37.53	Negligible
R10	0.1718	37.89	Negligible
R11	0.1397	37.54	Negligible
R12	0.1433	37.43	Negligible
R13	1.9888	38.16	Negligible
R14	-0.6745	37.51	Negligible
R15	2.9295	38.40	Negligible
R16	2.0450	38.07	Negligible
R17	2.2208	38.14	Negligible
R18	2.0244	38.07	Negligible

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R19	1.1487	37.72	Negligible
R20	1.4070	37.83	Negligible
R21	1.5155	37.88	Negligible
R22	1.4249	37.84	Negligible
R23	2.4819	38.25	Negligible
R24	1.9033	38.05	Negligible
R25	0.7990	37.58	Negligible
R26	0.1700	37.38	Negligible
R27	0.5057	37.46	Negligible
R28	0.1759	37.35	Negligible
R29	1.0356	37.65	Negligible
R30	0.2435	37.36	Negligible
R31	1.5880	37.86	Negligible
R32	0.9966	37.64	Negligible
R33	0.9452	37.62	Negligible
R34	1.3632	37.77	Negligible
R35	1.1778	37.70	Negligible
R36	1.4783	37.82	Negligible
R37	2.6002	38.25	Negligible

Table 6.5: Predicted PM₁₀ Impacts for S2 and S3

- 6.21 As indicated in Table 6.5, the significance of impacts on annual PM₁₀ concentrations as a result of the development, without canyons, was predicted to be negligible at all receptor locations in accordance with IAQM and EPUK guidance.

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R1	1.3249	38.47	Negligible
R2	1.8043	38.95	Negligible
R3	1.6233	38.76	Negligible
R4	1.7294	38.88	Negligible
R5	0.7594	38.25	Negligible
R6	0.2306	37.73	Negligible
R7	0.1581	37.59	Negligible
R8	0.2360	38.84	Negligible
R9	0.1412	37.53	Negligible
R10	0.1722	37.89	Negligible
R11	0.1401	37.54	Negligible
R12	0.1439	37.43	Negligible
R13	2.2068	38.25	Negligible
R14	-0.6747	37.51	Negligible

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R15	3.1462	38.49	Negligible
R16	2.1101	38.10	Negligible
R17	2.4541	38.23	Negligible
R18	2.1636	38.12	Negligible
R19	1.2719	37.77	Negligible
R20	1.6331	37.92	Negligible
R21	2.9517	38.44	Negligible
R22	3.2314	38.54	Negligible
R23	3.9183	38.82	Negligible
R24	2.0325	38.10	Negligible
R25	0.7996	37.58	Negligible
R26	0.1703	37.38	Negligible
R27	0.5070	37.46	Negligible
R28	0.1766	37.35	Negligible
R29	1.0478	37.66	Negligible
R30	0.2443	37.36	Negligible
R31	1.3882	37.79	Negligible
R32	1.1370	37.69	Negligible
R33	1.1929	37.71	Negligible
R34	1.3823	37.78	Negligible
R35	1.2261	37.72	Negligible
R36	1.5265	37.84	Negligible
R37	2.6113	38.26	Negligible

Table 6.6: Predicted PM₁₀ Impacts for S2 and S3

- 6.22 As indicated in Table 6.6, the significance of impacts on annual PM₁₀ concentrations as a result of the development, with canyons, was predicted to be negligible at all receptor locations in accordance with IAQM and EPUK guidance.
- 6.23 Based on the evaluation above showing a negligible impact with the development in place for both scenarios (S3 and S4), it is considered that annual PM₁₀ concentrations at the development site should not be viewed as a constraint to development. Therefore, the site is considered to be suitable for the proposed use without the implementation of mitigation techniques to protect future site users from elevated PM₁₀ concentrations.

Particulate Matter (PM_{2.5}) Impacts

- 6.24 The modelled results of all future year scenarios are shown in in Figures 6.7 to 6.9. Results show that predicted annual PM_{2.5} concentrations are not expected to exceed the AQO of 25 µg/m³ across the site boundary in 2030 for any future year scenario.

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- 6.25 It should also be noted that predicted annual $PM_{2.5}$ concentrations are likely to be lower at elevated heights due to increased distance from emission sources, such as the local road network. Therefore, predicted concentrations at heights above ground floor level are considered to be acceptable in regard to pollutant exposure and have not been assessed further.

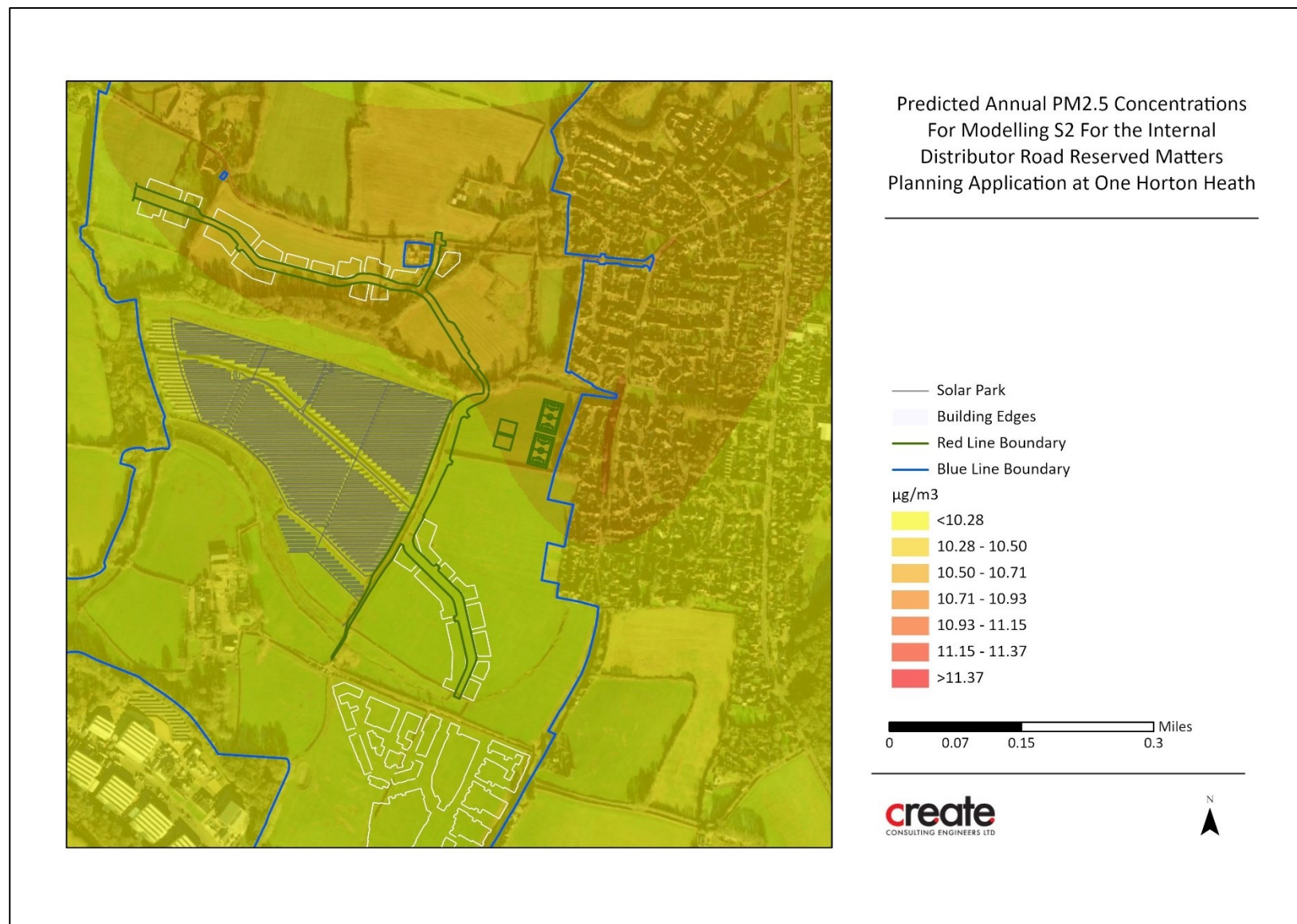


Figure 6.7: Predicted Annual PM_{2.5} Concentrations for the S2

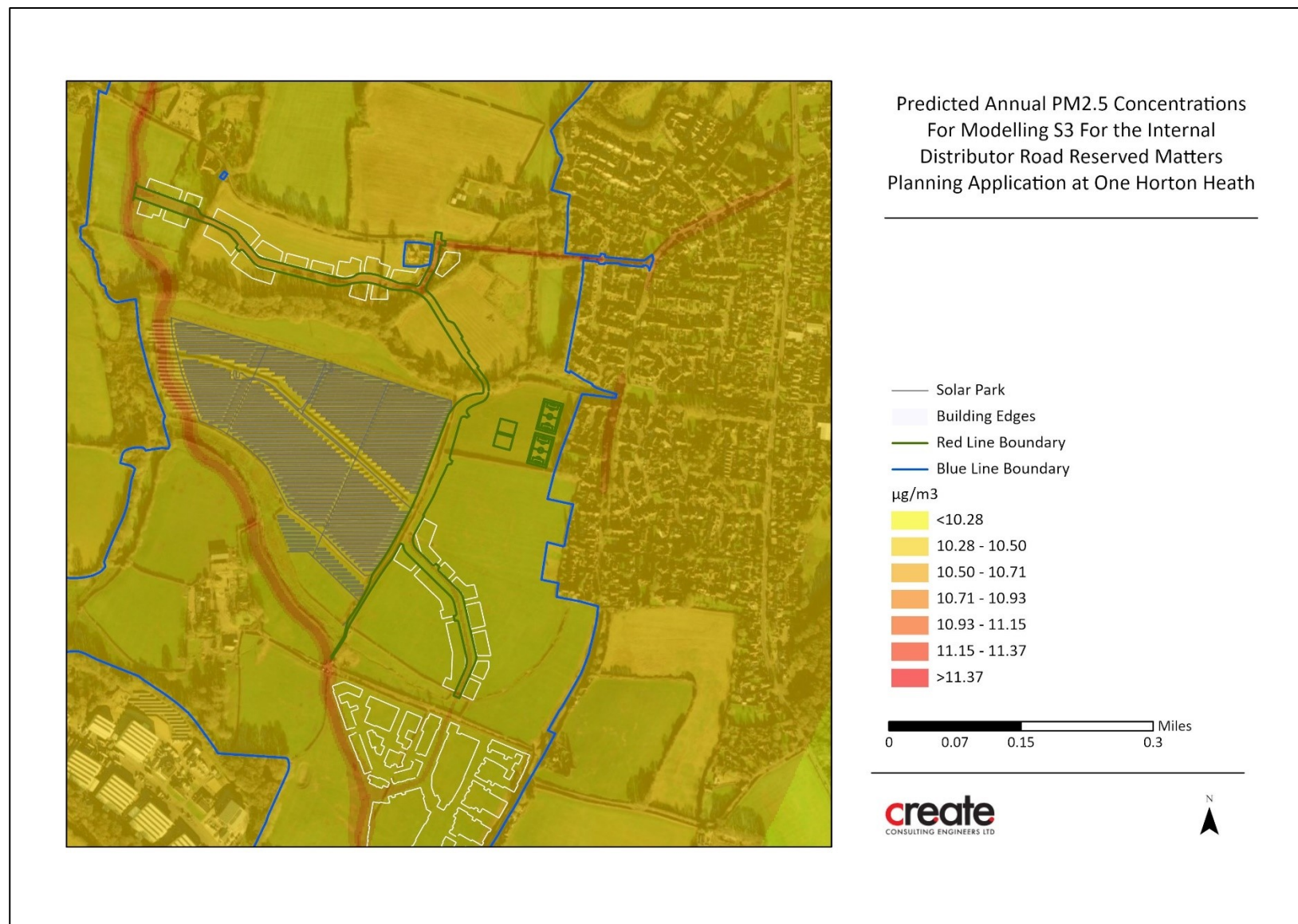


Figure 6.8: Predicted Annual PM_{2.5} Concentrations for the S3

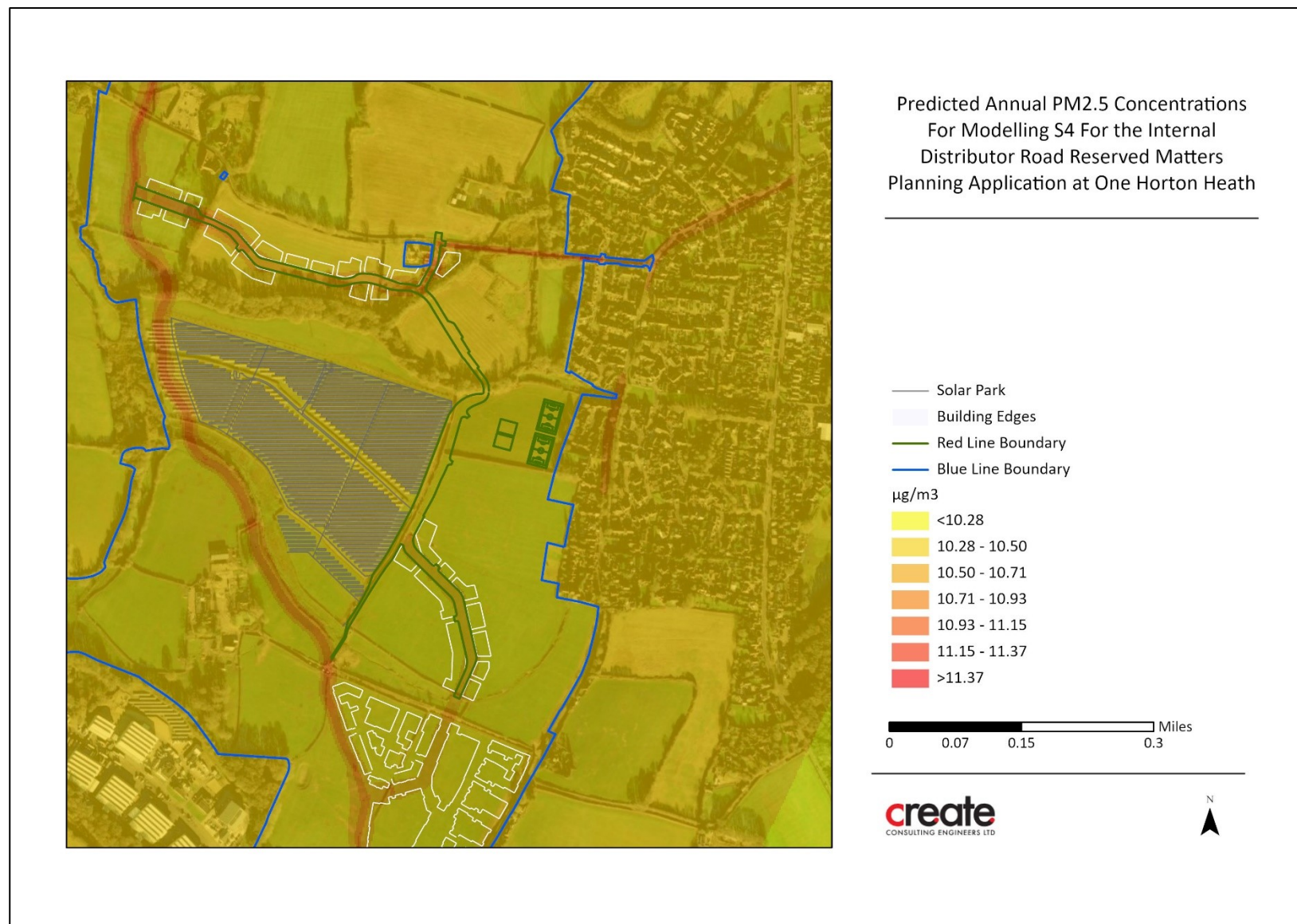


Figure 6.9: Predicted Annual PM_{2.5} Concentrations for the S4

6.26 In accordance with the assessment criteria the annual PM_{2.5} concentrations were predicted for S2, S3 and S4 scenarios at various sensitive receptor locations. The predicted annual PM_{2.5} concentrations and changes between the scenarios are summarised in Table 6.7.

Sensitive Receptor	Predicted Annual PM _{2.5} Concentration (µg/m ³)					
	S2	S3	S4	Change Between S2 and S3	Change Between S2 and S4	Change Between S3 and S4
R1	10.43	10.55	10.55	0.1123	0.1123	0.00001
R2	10.50	10.65	10.65	0.1548	0.1548	0.00002
R3	10.47	10.61	10.61	0.1386	0.1386	0.00002
R4	10.49	10.64	10.64	0.1481	0.1482	0.00002
R5	10.43	10.50	10.50	0.0646	0.0646	0.00002
R6	10.37	10.38	10.38	0.0192	0.0192	0.00001
R7	10.34	10.35	10.35	0.0131	0.0131	0.00001
R8	10.61	10.63	10.63	0.0202	0.0202	0.00002
R9	10.33	10.34	10.34	0.0117	0.0117	0.00002
R10	10.40	10.42	10.42	0.0144	0.0144	0.00003
R11	10.33	10.34	10.34	0.0116	0.0116	0.00004
R12	10.31	10.32	10.32	0.0118	0.0119	0.00005
R13	10.31	10.48	10.50	0.1686	0.1874	0.01884
R14	10.39	10.34	10.34	-0.0551	-0.0551	-0.00001
R15	10.28	10.53	10.55	0.2483	0.2674	0.01904
R16	10.29	10.46	10.46	0.1714	0.1770	0.00558
R17	10.29	10.47	10.49	0.1864	0.2065	0.02008
R18	10.29	10.46	10.47	0.1696	0.1816	0.01192
R19	10.29	10.38	10.39	0.0954	0.1057	0.01036
R20	10.29	10.41	10.43	0.1172	0.1363	0.01914
R21	10.29	10.42	10.54	0.1264	0.2498	0.12337
R22	10.29	10.41	10.56	0.1189	0.2743	0.15546
R23	10.29	10.50	10.63	0.2105	0.3364	0.12587
R24	10.29	10.45	10.47	0.1602	0.1712	0.01105
R25	10.28	10.35	10.35	0.0665	0.0665	0.00005
R26	10.29	10.31	10.31	0.0140	0.0140	0.00002
R27	10.28	10.32	10.32	0.0419	0.0420	0.00011
R28	10.29	10.30	10.30	0.0145	0.0145	0.00005
R29	10.28	10.37	10.37	0.0862	0.0872	0.00102
R30	10.28	10.30	10.30	0.0200	0.0201	0.00007
R31	10.28	10.41	10.40	0.1323	0.1155	-0.01688
R32	10.28	10.36	10.37	0.0825	0.0943	0.01176
R33	10.28	10.36	10.38	0.0782	0.0990	0.02075
R34	10.28	10.39	10.39	0.1133	0.1149	0.00161
R35	10.28	10.38	10.38	0.0977	0.1018	0.00406
R36	10.28	10.40	10.41	0.1230	0.1271	0.00407

Sensitive Receptor	Predicted Annual PM _{2.5} Concentration (µg/m ³)					
	S2	S3	S4	Change Between S2 and S3	Change Between S2 and S4	Change Between S3 and S4
R37	10.28	10.50	10.50	0.2193	0.2203	0.00097

Table 6.7: Predicted Annual PM_{2.5} Concentrations and Differences

- 6.27 As indicated in Table 6.7, predicted annual PM_{2.5} concentrations were below the AQO at all sensitive receptor locations and there was no significant difference in the concentrations between S3 and S4 against S2.
- 6.28 Receptor location R14 shows a decrease in predicted annual PM_{2.5} concentrations for S3 and S4 in comparison with S2. This is due to the decrease of traffic on Fir Tree Lane, as the western road will become a bridleway with the development in place.
- 6.29 There is an increase in annual PM_{2.5} concentrations from S3 to S4 at all sensitive receptor locations, except R31. The changes are due to the modelling of the canyon heights along the Internal Distributor Road. The changes are minimal ranging from 0.00001 to 0.15546. The decrease at R31 is expected to be due to the positioning of the buildings, creating a canyon that allows air to disperse away from the receptor.
- 6.30 Predicted impacts on annual PM_{2.5} concentrations in relation to AQAL at the sensitive receptor locations are summarised in Table 6.8 and 6.9.

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R1	1.0648	42.19	Negligible
R2	1.4531	42.61	Negligible
R3	1.3061	42.44	Negligible
R4	1.3926	42.55	Negligible
R5	0.6153	42.00	Negligible
R6	0.1849	41.54	Negligible
R7	0.1266	41.41	Negligible
R8	0.1903	42.51	Negligible
R9	0.1128	41.36	Negligible
R10	0.1379	41.67	Negligible
R11	0.1118	41.37	Negligible
R12	0.1146	41.27	Negligible
R13	1.6085	41.92	Negligible
R14	-0.5330	41.34	Negligible
R15	2.3580	42.13	Negligible
R16	1.6387	41.83	Negligible
R17	1.7799	41.90	Negligible
R18	1.6220	41.83	Negligible

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R19	0.9188	41.53	Negligible
R20	1.1263	41.62	Negligible
R21	1.2138	41.66	Negligible
R22	1.1421	41.63	Negligible
R23	2.0049	42.00	Negligible
R24	1.5319	41.82	Negligible
R25	0.6421	41.40	Negligible
R26	0.1360	41.23	Negligible
R27	0.4055	41.30	Negligible
R28	0.1406	41.20	Negligible
R29	0.8316	41.47	Negligible
R30	0.1945	41.21	Negligible
R31	1.2709	41.65	Negligible
R32	0.7964	41.45	Negligible
R33	0.7552	41.43	Negligible
R34	1.0900	41.57	Negligible
R35	0.9414	41.51	Negligible
R36	1.1826	41.61	Negligible
R37	2.0888	42.00	Negligible

Table 6.8: Predicted PM_{2.5} Impacts for S2 and S3

- 6.31 As indicated in Table 6.8, the significance of impacts on annual PM_{2.5} concentrations as a result of the development, without canyons, was predicted to be negligible at all receptor locations in accordance with IAQM and EPUK guidance.

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R1	1.0649	42.19	Negligible
R2	1.4533	42.61	Negligible
R3	1.3063	42.44	Negligible
R4	1.3928	42.55	Negligible
R5	0.6155	42.00	Negligible
R6	0.1850	41.54	Negligible
R7	0.1267	41.41	Negligible
R8	0.1904	42.51	Negligible
R9	0.1130	41.36	Negligible
R10	0.1381	41.67	Negligible
R11	0.1121	41.37	Negligible
R12	0.1151	41.27	Negligible
R13	1.7851	42.00	Negligible
R14	-0.5331	41.34	Negligible

Sensitive Receptor	Change in Concentration Relative to the AQAL (%)	Long Term Average Concentration (%)	Impact
R15	2.5342	42.20	Negligible
R16	1.6911	41.86	Negligible
R17	1.9678	41.98	Negligible
R18	1.7340	41.88	Negligible
R19	1.0175	41.57	Negligible
R20	1.3078	41.70	Negligible
R21	2.3701	42.16	Negligible
R22	2.5970	42.25	Negligible
R23	3.1657	42.50	Negligible
R24	1.6359	41.86	Negligible
R25	0.6426	41.40	Negligible
R26	0.1362	41.23	Negligible
R27	0.4066	41.30	Negligible
R28	0.1412	41.20	Negligible
R29	0.8413	41.47	Negligible
R30	0.1952	41.21	Negligible
R31	1.1106	41.58	Negligible
R32	0.9088	41.50	Negligible
R33	0.9536	41.52	Negligible
R34	1.1053	41.58	Negligible
R35	0.9802	41.53	Negligible
R36	1.2212	41.63	Negligible
R37	2.0978	42.00	Negligible

Table 6.9: Predicted PM_{2.5} Impacts for S2 and S4

- 6.32 As indicated in Table 6.9, the significance of impacts on annual PM_{2.5} concentrations as a result of the development, with canyons, was predicted to be negligible at all receptor locations in accordance with IAQM and EPUK guidance.
- 6.33 Based on the evaluation above showing a negligible impact with the development in place for both scenarios (S3 and S4), it is considered that **annual PM_{2.5} concentrations at the development site should not be viewed as a constraint to development**. Therefore, the site is considered to be suitable for the proposed use without the implementation of mitigation techniques to protect future site users from elevated PM_{2.5} concentrations.

7.0 BEST PRACTICE MEASURES

Construction Phase

- 7.1 The IAQM guidance provides a number of potential mitigation measures to reduce impacts from the construction phases. As a high risk of dust impacts from earthworks, construction and trackout activities were identified, mitigation measures are required. These have been adapted for the development site as summarised in Table 5.6.
- 7.2 These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by EBC.

Operational Phase

- 7.3 The anticipated operational effects, illustrated in Section 6, have been identified as **negligible**. Therefore, there is not a requirement to mitigate the anticipated operational effects of the development.
- 7.4 Potential best practice mitigation options to further reduce operational effects are listed below, suggested by IAQM. It is acknowledged that this is not an exhaustive list but sets out a range of mitigation measures which could be implemented at the application stage of the development:
- At least 1 Electric Vehicle “fast charge” point per 10 residential dwellings and/or 1000 m² of commercial space - This shall be based on the best technology available at the time of planning approval for One Horton Heath parcels;
 - Travel Plan (where required) including mechanisms for discouraging high emission vehicle use and encouraging the uptake of low emission fuels and technologies for One Horton Heath parcels;
 - A Welcome Pack available to all new residents online and as a booklet, containing information and incentives to encourage the use of sustainable transport modes from new occupiers for One Horton Heath parcels; and
 - Car club provision within One Horton Heath parcels or support given to local car club/Electric vehicle car clubs.
- 7.5 If the above measures are implemented, this will further reduce the potential impacts associated with the development.

8.0 CONCLUSIONS

- 8.1 Create Consulting Engineers Ltd have been appointed by One Horton Heath team on behalf of Eastleigh Borough Council to undertake an Air Quality Assessment in support of the standalone planning application of the Internal Distributor Road at One Horton Heath.
- 8.2 During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by earthworks, construction and trackout activities was predicted to be **negligible**.
- 8.3 The dispersion modelling results indicated that predicted annual NO₂, PM₁₀ and PM_{2.5} concentrations for all scenarios were below the AQOs.
- 8.4 Receptor location R14 shows a decrease in predicted annual NO₂, PM₁₀ and PM_{2.5} concentrations for S3 and S4 in comparison with S2. This is due to the decrease of traffic on Fir Tree Lane, as the western road will become a bridleway with the development in place.
- 8.5 There is an increase in annual NO₂, PM₁₀ and PM_{2.5} concentrations from S3 to S4 at all sensitive receptor locations, except R31. The changes are due to the modelling of the canyon heights along the Internal Distributor Road. The decrease at R31 is expected to be due to the positioning of the buildings, creating a canyon that allows air to disperse away from the receptor.
- 8.6 The overall significance of potential impacts as a result of NO₂, PM₁₀ and PM_{2.5} concentrations, from the operational phase, were predicted to be **negligible** at all sensitive receptor locations considered for the opening year scenario, in accordance with the EPUK and IAQM guidance.
- 8.7 As there is a negligible impact shown for both scenarios (S3 and S4), it is considered that all pollutant concentrations at the development site should not be viewed as a constraint to development. Therefore, the site is considered to be suitable for the proposed use without the implementation of mitigation techniques to protect future site users from elevated PM_{2.5} concentrations.
- 8.8 Based on the assessment results, **air quality is not considered a constraint** to planning consent for the proposed development scenarios.

9.0 DISCLAIMER

- 9.1 Create Consulting Engineers Limited disclaims any responsibility to the Client, Eastleigh Borough Council, and others in respect of any matters outside the scope of this report.
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10.0 REFERENCES

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- 10.2 *Clean Air Strategy 2019*. Department for Environment, Food and Rural Affairs (2019)
- 10.3 *Eastleigh Borough Council Air Quality Action Plan 2020 – 2025*. Eastleigh Borough Council (2020)
- 10.4 *Eastleigh Borough Local Plan (2016-2036)*. Eastleigh Borough Council (2022)
- 10.5 *Department for Environment Food and Rural Affairs (Defra) (2018) A Green Future: Our 25 Year Plan to Improve the Environment*.
- 10.6 *Land-Use Planning and Development Control: Planning for Air Quality*. EPUK & IAQM, Moorcroft, Barrowcliffe. et al (2017)
- 10.7 *Local Air Quality Management Technical Guidance (LAQM.TG22)*. Department for Environment, Food and Rural Affairs (2022)
- 10.8 *Guidance on the assessment of dust from demolition and construction, version 1.1*. IAQM, Holman et al (2014)
- 10.9 *National Planning Policy Framework*. Ministry of Housing, Communities and Local Government (2021)
- 10.10 *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1)*. Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland (2007)

APPENDICES

APPENDIX A

Construction Phase Assessment Methodology

This section details the methodology and criteria used to assess the construction phase assessment in conjunction with IAQM guidance.

Construction Phase Assessment

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 within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'.

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

- Demolition;
- Earthworks;
- Construction; and
- Trackout

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

- Annoyance due to dust soiling;
- The risk of health effects due to a significant increase in exposure to PM₁₀; and
- Harm to ecological receptors

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 from the site boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should proceed to Step 2. Additionally, should ecological receptors be identified within 50m of the boundary site or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should also proceed 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 to 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.

Magnitude	Activity	Criteria
Large	Demolition	• Total volume of building to be demolished 50,000m³ • Potential dusty construction material (e.g concrete) • Onsite crushing and screening • Demolition activities more than 20m above ground
	Earthworks	• Total site area greater than 10,000m² • 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 100,000m³ • 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 volume of building to be demolished 20,000m³ – 50,000m³ • Potential dusty construction material, • Demolition activities 10-20m above ground level
	Earthworks	• Total site area 2,500m² to 10,000m² • 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 25,000m³ to 100,000m³ • 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

Magnitude	Activity	Criteria
Small	Demolition	• Total volume of building to be demolished less than 20,000m³ • Construction material with low potential for dust release (e.g. metal cladding, or timber) • Demolition activities less than 10m above ground level • Demolition during wetter months
	Earthworks	• Total site area less than 2,500m² • 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 25,000m³ • 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

Table A1: Construction Dust Magnitude

Step 2B defines the sensitivity of the area around the development site for construction, earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table A2.

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 AQO for PM₁₀ 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

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
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

Table A2: Examples of Factors Defining Sensitivity of an Area

The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts during the construction phase:

- 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 the 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 were considered in the undertaking of this assessment.

The sensitivity of the area to dust soiling effects on people and property is shown in Table A3.

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

Table A3: Area Sensitivity to Dust Soiling Effects on People and Property

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

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	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
	28 - 32µg/m ³	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	Less than 24µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Human Health Impacts

Table A5 outlines the sensitivity of the area to ecological impacts.

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

Table A5: Area Sensitivity to Ecological Impacts

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 works.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Medium	Low	Negligible

Table A6: Dust Category from Demolition

Table A7 outlines the risk category from earthworks.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table A7: Dust Category from Earthworks

Table A8 outlines the risk category from construction activities.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table A8: Dust Category from Construction

Table A9 outlines the risk category from Trackout.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Low	Negligible
Low	Low	Low	Negligible

Table A9: Dust Risk Category from Trackout

Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM 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.

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

APPENDIX B

Operational Phase Assessment Methodology

This section details the methodology and criteria used to assess the operational phase assessment in conjunction with IAQM and LAQM.TG22 guidance.

Operational Phase Assessment

The proposed development includes sensitive land uses. As such, the proposed development has the potential to introduce the poor quality of air in the area and worsen the current local air quality.

Detailed dispersion modelling is therefore to be undertaken to quantify NO₂, PM₁₀ and PM_{2.5} concentrations across the site and determine suitability for the proposed use, using the following scenarios:

- Baseline Year, 2019 (S1);
- Future year without development, 2030 (S2);
- Future year with the development and no canyons, 2030 (S3); and
- Future year with the development and canyons, 2030 (S4).

The S1 scenario is representative of anticipated traffic data for a baseline year of 2019 based on information gathered from DfT Traffic Counts Website.

The S2 (i.e., without development) scenario is representative of anticipated traffic data with predicted variations in traffic flow patterns without the development, the future modelled year in 2030. These inputs were provided by the transport consultants for the project, Campbell Reith.

The S3 and S4 (i.e., with development) scenarios are representative of anticipated traffic data with the addition of predicted variations in traffic flow patterns as a result of the proposals and committed flows from the community, for the future modelled year in 2030. These inputs were provided by the transport consultants for the project, Campbell Reith.

It should be noted that air quality is predicted to improve in the future. However, in order to provide a robust assessment, background concentrations for 2019 were utilised within the dispersion model. The use of 2030 traffic data with 2019 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Receptors potentially sensitive to changes in NO₂, PM₁₀ and PM_{2.5} concentrations were identified within 500 m of the affected highway network in accordance with the guidance provided within the IAQM guidance on the likely limits of pollutant dispersion from road sources. LAQM.TG22 provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;
- Hospitals; and

- Care homes.

The sensitivity impact significance of each receptor was defined in accordance with the criteria are shown in Tables A3 to A5 (Appendix A).

A desk-top study was undertaken to identify any existing and future sensitive receptor locations in the vicinity of the site that require specific consideration during the assessment.

The sensitive receptors are identified in Section 4 and represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposed development that have not been individually identified above.

The following factors may provide some assistance in determining the overall significance of a development:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease; and
- The extent to which an objective is exceeded e.g. an annual mean NO₂ concentration of 41 µg/m³ should attract less significance than an annual mean of 51 µg/m³.

These factors were considered, and an overall significance determined for the impact of operational phase road traffic emissions.

It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

The criteria shown in Table B1, is adapted from the EPUK and IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality with sensitivity descriptors included to allow comparisons of various air quality impacts.

Long Term Average Concentration	% Change in Concentration Relative to AQO			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO	Slight	Moderate	Moderate	Substantial

Long Term Average Concentration	% Change in Concentration Relative to AQO			
	1	2-5	6-10	>10
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

Table B1: Operational Traffic Exhaust Emissions – Assessment of Impacts

It should be noted that changes of up to 0.5% will be described as negligible in accordance with the EPUK and IAQM guidance.

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table B1, the EPUK and IAQM document states that this framework is to be used as a starting point to make a judgement on significance of effect, but other influences might need to be accounted for.

Whilst impacts might be determined as 'slight', 'moderate' or 'substantial' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances.

The descriptors of impact significance for the annual mean concentration for both NO₂ and PM₁₀ that take account of the magnitude of changes for the proposed development based on guidance from EPUK are shown in Table B2 below.

Total Concentration Related to Objective/Limit Value	Change in Concentration		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (>40 µg m⁻³)	Minor Adverse	Moderate Adverse	Major Adverse
Just Below Objective/Limit Value with Scheme (36-40 µg m⁻³)	Minor Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (30-36 µg m⁻³)	Negligible	Minor Adverse	Minor Adverse
Well Below Objective/Limit Value with Scheme (<30 µg m⁻³)	Negligible	Negligible	Minor Adverse
Decrease with Scheme			
Above Objective/Limit Value with Scheme (> 40 µg m⁻³)	Minor Beneficial	Moderate Beneficial	Major Beneficial
Just Below Objective/Limit Value with Scheme (36-40 µg m⁻³)	Minor Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with Scheme (30-36 µg m⁻³)	Negligible	Minor Beneficial	Minor Beneficial
Well Below Objective/Limit Value with Scheme (< 30 µg m⁻³)	Negligible	Negligible	Minor Beneficial

Table B2: Impact Descriptors for Changes to Annual Mean Concentration of NO₂ and PM₁₀

Once the magnitude of the change has been established, the impact at each relevant receptor needs to be described. The impact magnitude at each receptor location can be described using the changes

stated above as Negligible, Minor, Moderate or Major, as either Adverse or Beneficial, and either Temporary or Permanent.

The overall significance should be described separately for both the impact of emissions related to the proposed development on existing receptors, and for the impacts of emissions from existing source(s) on new exposure being introduced from the proposed development.