BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

ENVIRONMENT

RICHBOROUGH ESTATES LIMITED

SANDWICH ROAD, SHOLDEN, KENT

Air Quality Assessment

BMW2914

www.bwbconsulting.com

RICHBOROUGH ESTATES LIMITED

SANDWICH ROAD, SHOLDEN, KENT

AIR QUALITY ASSESSMENT

Birmingham
Livery Place, 35 Livery Street, Colmore Business District, Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way, Leeds
LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street, Manchester, M1 3HU
T: 0161 233 4260

Nottingham
Waterfront House, Station Street, Nottingham NG2 3DQ
T: 0115 924 1100

February 2021

DOCUMENT ISSUE RECORD

Document Number:	**SRS-BWB-ZZ-ZZ-RP-LA-0001_AQA_S0_P02**
BWB Reference:	BMW2914-001

Revision	Date of Issue	Status	Author:	Checked:	Approved:
3.0	26/02/2021	Issue	E. Thomas BSc (Hons), AIAQM, AMIEnvSci	F. Hoyle MSc, BSc, MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc

Notice

EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough Estates Limited to undertake an air quality assessment for a proposed residential development at land off Sandwich Road in Sholden, Kent.

The proposed development Site is located within the administrative area of Dover District Council and lies adjacent to the A258 Sandwich Road. The Site is not located within, or in the vicinity of, an Air Quality Management Area.

A qualitative construction phase dust assessment was undertaken in accordance with Institute of Air Quality Management guidance and measures were recommended for inclusion in a Dust Management Plan to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions was considered to be 'not significant' in accordance with Institute of Air Quality Management guidance.

A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$) were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance and Institute of Air Quality Management & Environmental Protection UK guidance. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development on local air quality was predicted to be 'negligible' overall in accordance with guidance.

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were also predicted across the proposed development Site and the suitability of the Site for the proposed residential use considered with regard to air quality. Pollutant concentrations were predicted to be below the relevant air quality objectives and the Site was therefore considered suitable for the proposed use.

CONTENTS

FIGURES

APPENDICES

1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting Limited was appointed by Richborough Estates Limited to undertake an air quality assessment for a proposed residential development at land off Sandwich Road in Sholden, Kent ('the Site').

1.2 The assessment considers construction phase dust impacts and operational phase road traffic emissions. A qualitative construction phase dust assessment was undertaken in accordance with relevant guidance. A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified receptor locations. In addition, pollutant concentrations were predicted across the proposed development Site.

1.3 This report is necessarily technical in nature, so to assist the reader, a glossary of air quality terminology can be found in **Appendix A.**

Site Setting

1.4 The Site is located off the A258 Sandwich Road and is located within the administrative area of Dover District Council (DDC). **Figure 1.1** details the location of the proposed development. The Site currently comprises open fields.

1.5 To the north of the Site lies open fields and the A258 Sandwich Road with existing residential dwellings beyond. To the east of the Site lies Sholden Church of England Primary School and existing residential dwellings, with the A258 Sandwich Road beyond. Existing residential dwellings are located to the south of the Site, with Mongeham Road and Hornbeam Primary School beyond. To the west lies open fields.

1.6 Principal air pollution sources in the vicinity of the development are likely to comprise road traffic emissions. The Site is not located within, or in the vicinity of, an Air Quality Management Area (AQMA).

Proposed Development

1.7 The proposed development comprises an outline application for the erection of up to 117 residential dwellings with associated parking and means of access. The Site boundary for the proposed development is shown in **Figure 1.1**. The proposed development masterplan is detailed in **Appendix B**.

Figure 1.1: Site Location

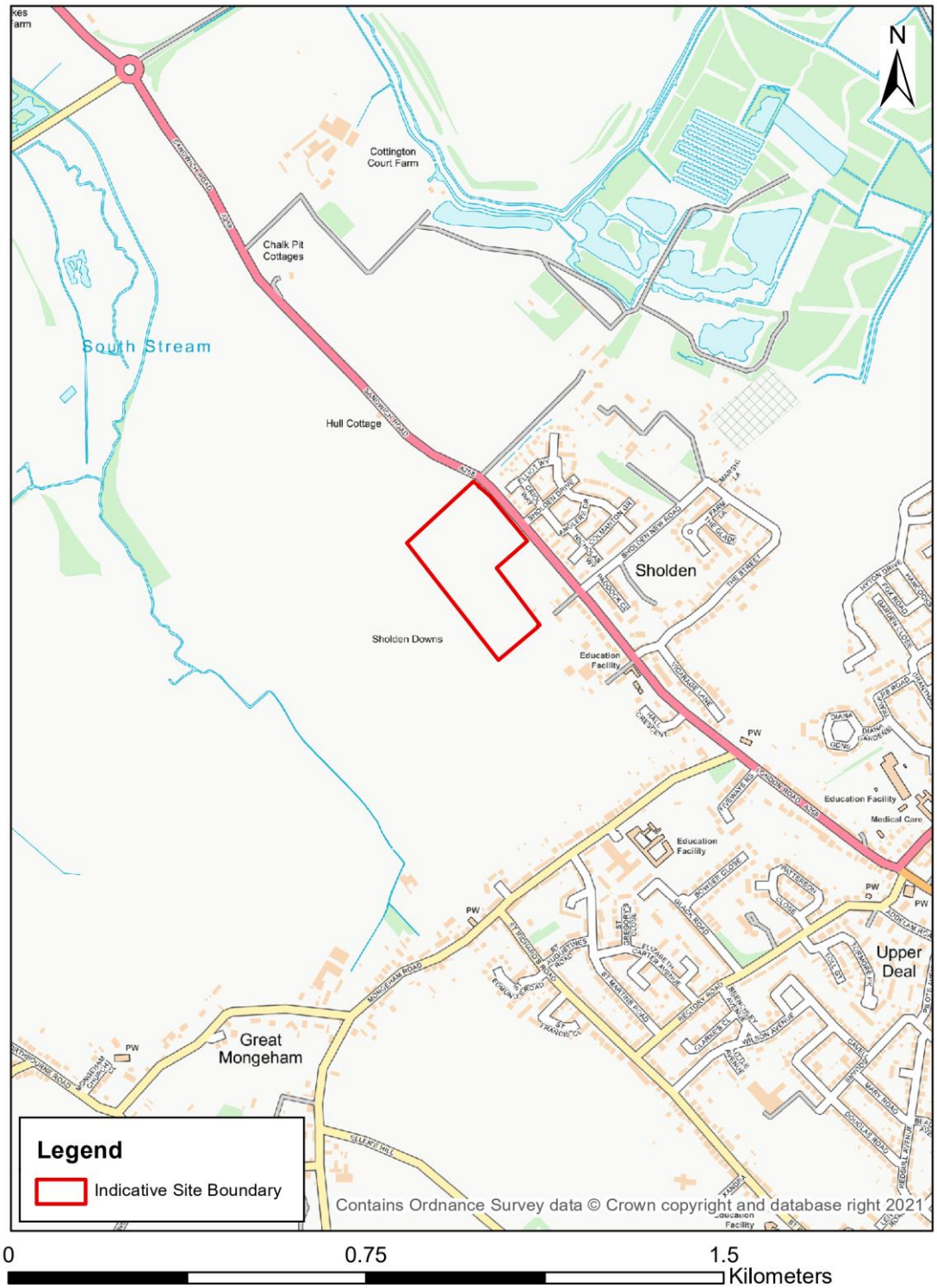

Figure 1.1 Site Location

Drawn by: ET
Date: 25/02/2021

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

2. LEGISLATION, PLANNING POLICY & GUIDANCE

National Legislation and Planning Policy

The UK Air Quality Strategy

2.1 European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive[1] sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000[2], as amended, for the purpose of the Local Air Quality Management Framework.

2.2 The UK Government are required under the Environment Act 1995[3] to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997[4] and was most recently reviewed and updated in 2007[5]. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.

2.3 Part IV of the Environment Act[3] requires local authorities in the UK to review local air quality within their administrative area and, if relevant air quality standards and objectives are likely to be exceeded, designate Air Quality Management Areas (AQMAs). Following the designation of an AQMA, local authorities are required to publish an Air Quality Action Plan (AQAP) detailing measures to be taken to improve local air quality and work towards meeting the relevant air quality standards and objectives.

National Planning Policy Framework

2.4 The National Planning Policy Framework (NPPF)[6] was amended in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

2.5 With regard to assessing cumulative effects the NPPF[6] states:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*
>
> *[…]"*

2.6 The NPPF[6] recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

[1] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[2] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[3] HMSO (1995) The Environment Act 1995, London: TSO
[4] Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO
[5] Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[6] Ministry of Housing, Communities & Local Government (2019) National Planning Policy Framework, HMSO London

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

[…]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

[…]

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.

[…]

Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

Planning Practice Guidance

2.7 The Planning Practice Guidance (PPG) for air quality[7] was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.

2.8 The PPG[7] sets out the following with regard to air quality and planning:

- *"What air quality considerations does planning need to address;*
- *What is the role of plan-making with regard to air quality;*
- *Air quality concerns relevant to neighbourhood planning;*
- *What information is available about air quality;*
- *When could air quality considerations be relevant to the development management process;*
- *What specific issues may need to be considered when assessing air quality impacts;*

[7] Department for Communities and Local Government (2019) Planning Practice Guidance Air Quality

- *How detailed does an air quality assessment need to be; and*
- *How can an impact on air quality be mitigated".*

2.9 The PPG[7] sets out the pollutants for which there are legally bindings limits for concentrations and those which the UK also has national emissions reduction commitments.

2.10 The PPG[7] states that development plans may need to consider:

- *"what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;*
- *the impact of point sources of air pollution (pollution that originates from one place);*
- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;*
- *ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and*
- *opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement".*

2.11 The PPG[7] also states what may be considered relevant to determining a planning application and these include whether a development would:

- *"Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*

- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value".*

2.12 The PPG[7] provides guidance regarding what should be included within an air quality assessment. Examples of potential air quality mitigation measures are also provided.

Local Planning Policy

Dover District Local Development Framework Core Strategy

2.13 The Dover District Local Development Framework Core Strategy[8] was adopted in 2010. There are no policies relating to air quality at the Site within the Core Strategy. Policy CP8 Dover Waterfront mentions air quality but this is not relevant to air quality at the Site as this focusses on port operations and traffic on the A20 within the Dover AQMA.

Dover District Local Plan

2.14 DDC publsihed the draft Dover District Local Plan[9] for consultation in 2021. The following policies relate to air quality:

> *"DM Policy 41: Air Quality*
>
> *All development should be designed to encourage an increase in the use of sustainable modes of transport. In addition, major development proposals will be required to demonstrate a shift to the use of sustainable low emission transport in order to minimise the impact of vehicle emissions on air quality.*
>
> *Development proposals that might lead to a significant deterioration in air quality or national air quality objectives being exceeded, either alone, or in combination with other committed development, will be required to submit an Air Quality Assessment, carried out in accordance with the relevant guidance, to be agreed with the Local Planning Authority as part of planning applications. Such an Assessment should address.*
>
> *a) The cumulative effect of further emissions arising from the proposals; and,*
>
> *b) The proposed mitigation measures, including appropriate design and offsetting measures, which would prevent National Air Quality Objectives being exceeded or would reduce the extent of any air quality deterioration.*
>
> *Proposals which will result in National Air Quality Objectives being exceeded will not be permitted."*

Dover District Council Local Plan Air Quality Inputs Dispersion Modelling Assessment

2.15 To support the draft Dover District Local Plan[9], DCC published the Dover District Council Local Plan Air Quality Inputs Dispersion Modelling Assessment[10]. This study was reviewed and considered during the undertaking of this assessment.

[8] Dover District Council (2010) Dover District Local Development Framework Core Strategy
[9] Dover District Council (2020) Dover District Local Plan
[10] Dover District Council (2021) Local Plan Air Quality Inputs Dispersion Modelling Assessment

Air Quality Assessment Guidance

2.16 The following guidance was utilised in the air quality assessment:

- Defra, Local Air Quality Management Technical Guidance (LAQM.TG(16)) (2018)[11];
- Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction (2014)[12];
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)[13]; and
- Highways England, Design Manual for Roads and Bridges, LA 105 Air Quality (2019)[14].

[11] Defra (2018) Local Air Quality Management Technical Guidance LAQM.TG(16)
[12] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London
[13] Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality
[14] Highways England (2019) Design Manual for Roads and Bridges, LA 105 Air Quality

3. METHODOLOGY

Consultation with Dover District Council

3.1 Consultation was undertaken with the Environmental Health Department at DDC, in which the proposed assessment methodology was provided and agreed by email[15].

3.2 The agreed assessment methodology is detailed below:

- Construction Phase – A construction phase assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)[12].
- Operational Phase – A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated traffic on local air quality and predict pollutant concentrations at the proposed development Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) and particulate matter (PM_{10} and $PM_{2.5}$) at identified existing receptor locations for both without and with development scenarios. The change in pollutant concentrations as a result of development-generated traffic was then calculated. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG16)[11] and Institute of Air Quality Management and Environmental Protection UK (EPUK)[13] guidance. Pollutant concentrations were also predicted across the proposed development Site to consider the suitability of the Site for the proposed use with regard to air quality.
- Ecological Receptors – The Sandwich Bay to Hacklinge Marshes Site of Special Scientific Interest (SSSI) and Thanet Coast and Sandwich Bay Ramsar Site are located 300m west of the Site. As these designations were not located within 200m of roads affected by the proposed development, an assessment of ecological impacts associated with the proposed development was not undertaken, in accordance with Design Manual for Roads and Bridges (DMRB)[14].

3.3 Full details of the methodology used in the assessment as agreed with DDC are provided below.

Construction Phase Assessment

3.4 An assessment of the potential impacts arising from the construction of the proposed development was undertaken in accordance with IAQM Guidance[12]. The full assessment methodology is not reproduced within this report but a summary of the assessment steps is provided below.

- Step 1 – screen the requirement for a more detailed assessment. No assessment is required if there are no receptors within a certain distance of the works.
- Step 2 – assess the risk of dust impacts separately for each of the four activities considered (demolition, earthworks, construction and trackout).
    - Step 2A – determine the potential dust emission magnitude for each of the four activities;

[15] Consultation discussions via email with Dover District Council Environmental Health Department on 02/10/2020, 10/11/2020 and 19/11/2020.

- Step 2B – determine the sensitivity of the area;
- Step 2C – determine the risk of dust impacts by combining the findings of steps 2A and 2B.

- Step 3 – determine the site-specific mitigation for each of the four activities; and
- Step 4 – examine the residual effects and determine significance.

Road Traffic Emissions – Air Dispersion Modelling

3.5 The air dispersion model ADMS-Roads, version 5.0.0.1 was utilised in the assessment to predict concentrations of NOx, PM_{10} and $PM_{2.5}$ at existing and proposed receptor locations.

3.6 The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[11] and Institute of Air Quality Management and Environmental Protection UK guidance[13].

Assessment Scenarios and Traffic Data

3.7 The following scenarios were considered in the air dispersion modelling:

- Scenario 1: 2019 Verification Year;
- Scenario 2: 2020 Base Year;
- Scenario 3: 2024 Opening Year without development; and
- Scenario 4: 2024 Opening Year with development.

3.8 The Transport Assessment for the proposed development utilised the Dover Transportation Model which provides data for 2040. As Defra's air quality modelling tools were only available up to 2030 and the proposed development will become operational in 2024, the air quality assessment utilised traffic data from traffic counts undertaken in 2019 and an opening year of 2024, not 2040. This approach was discussed and agreed with the Environmental Health Department at DDC to provide a robust assessment of future air quality at the realistic opening year of the proposed development.

3.9 Traffic data were obtained from Hub Transport Consultants, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:

- A528 London Road;
- A258 Sandwich Road;
- B2056 Manor Road;
- Mongeham Road; and
- Site access.

3.10 In addition, traffic data for Middle Deal Road and Park Avenue were obtained from the Department for Transport[16] for use in the verification of the ADMS-Roads model.

3.11 The development generated vehicle movements, provided by the Transport Consultants for use in the air quality assessment, were based on a previous iteration of the development masterplan which included 250 proposed dwellings. The reduction in proposed dwelling numbers will lead to less additional development-generation vehicle movements on the local road network, and therefore the air quality assessment undertaken is considered to be conservative.

3.12 As agreed with DCC during consultation, to consider cumulative developments in the surrounding area, traffic generated from the following developments was included within the traffic data provided by the Transport Consultants:

- Outline application for up to 48 dwellings (comprising up to 14 affordable dwellings and up to 34 market dwellings), up to 64 bedroom care home (C2 use), publicly accessible open space (including children's play area), attenuation pond, and creation of vehicular access (two dwellings to be demolished), Land At Churchfield Farm The Street, Sholden (planning reference 17/01345);
- Outline application for the erection of up to 100 dwellings, Site at Cross Road, Deal (planning reference 19/00642); and
- Outline application with all matters reserved for up to 210 dwellings including up to 12 self-build plots, together with up to 2,500 sqm of office (Use Class B1) floorspace and up to 150 sqm of retail (Class A1) floorspace, Site at Betteshanger Sustainable Parks Betteshanger Road Betteshanger (planning reference 20/00419).

3.13 Consideration was given to the speeds at which vehicles are likely to travel within the study area. Free-flowing traffic conditions were modelled at speeds provided by the Transport Consultants. Queuing sections, including the junction of the A56 and A665 were modelled in accordance with Defra guidance[11].

3.14 Traffic data used in the air dispersion modelling are provided in **Appendix C.**

ADMS-Roads Model Inputs

3.15 The following model inputs were utilised in the assessment:

- Emission Factors – emission factors were utilised from the Defra Emission Factor Toolkit[17], version 10.1, for the years of assessment (2019, 2020 and 2024).
- Conversion of oxides of nitrogen – concentrations of NOx were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO_2) using the Defra NOx to NO_2 calculator[18], version 8.1.
- Meteorological Data – hourly sequential meteorological data for the verification year of assessment (2019) were obtained for the Langford Bay recording station in Dover. This is the closest, most representative recording station to the proposed development Site. The wind rose for 2019 is provided in **Appendix D**.

[16] Department for Transport, traffic counts website https://roadtraffic.dft.gov.uk/ [accessed November 2020]
[17] Defra (2020) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]
[18] Defra (2020) NOx to NO_2 Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]

- Surface roughness and Monin-Obukhov length (MO) – a surface roughness of 0.5 and an MO length of 10 utilised in the dispersion model. These are representative of the small town conditions of the study area.
- Background pollutant concentrations – background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the study area were obtained from the pollutant concentrations maps[19] provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2019, 2020 and 2024).
- Model verification – model verification was undertaken using DDC monitoring data available for the study area. Full details of the verification procedure are provided in **Appendix E.**
- Calculation of short term PM_{10} concentrations – the following calculation, as detailed in Defra guidance[11], was utilised to calculate the number of exceedance of the 24-hour mean PM_{10} air quality objective:

$$\text{Number of 24-Hour Mean Exceedance} = -18.5 + 0.00145 * \text{Annual Mean}^3 + (206 / \text{Annual Mean})$$

- The IAQM released a position statement in July 2018[20] regarding dealing with the uncertainty in vehicle NOx emissions within air quality assessments. This recommends that sensitivity analyses be undertaken and professional judgement be applied to consider the scenario where NOx emissions do not reduce as rapidly as shown by the EFT. Defra released new versions of the air quality assessment tools in August 2020, including updated versions of the background concentration maps, Emission Factor Toolkit and NOx to NO_2 Calculator. At the time of writing the IAQM had not released a revised position statement. As such, and to provide a conservative assessment, a sensitivity analysis was undertaken and emission factors, NOx to NO_2 calculator inputs and background concentrations were kept at base year (2020) levels. Details of the sensitivity analysis are provided in **Appendix F**.

Limitations and Assumptions

3.16 There are uncertainties associated with both measured and predicted pollutant concentrations. The model (ADMS-Roads) used in this assessment relies on input data (including predicted traffic flows), which are also subject to uncertainty. The model itself simplifies complex physical systems into a range of algorithms. In addition, local microclimatic conditions may affect the concentrations of pollutants that the ADMS-Roads model will not take into account.

3.17 The monitoring location, utilised within the model verification process, was annualised in accordance with Defra guidance[11] as monitoring commenced in October 2019 and therefore data capture in 2019 was below 75%.

3.18 To reduce the uncertainty associated with predicted concentrations, model verification was carried out following guidance set out in Defra guidance[11]. As the model was verified using local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

[19] Defra (2020) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018]
[20] Institute of Air Quality Management (2018) Position Statement: Dealing with Uncertainty in Vehicle NOx Emissions within Air Quality Assessments, Version 1.1

Assessment Criteria

3.19 Predicted pollutant concentrations were compared to the relevant air quality objectives. The current relevant air quality standards and objectives are detailed in **Table 3.1.**

Table 3.1: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective (µg.m^{-3})	Date to Achieve by
NO_2	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM_{10}	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
$PM_{2.5}$	Annual mean target (15% cut in annual mean (urban background exposure)	25	2010 - 2020

3.20 Guidance is provided by the Institute of Air Quality Management and Environmental Protection UK[13] to determine the significance of the impact of development-generated road traffic emissions on local air quality. The impact descriptors at receptor locations are detailed in **Table 3.2.** These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the relevant air quality objectives.

Table 3.2: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1%	2 – 5%	6 – 10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: Figures rounded up to the nearest whole number, therefore any value less than 1% after rounding (effectively less than 0.5%) will be described as negligible.

4. BASELINE CONDITIONS

Local Air Quality Management

4.1 The proposed development is not located within, or in the vicinity of, an AQMA designation. The nearest AQMA is located in Dover, approximately 10km south of the Site.

Local Air Quality Monitoring

Nitrogen Dioxide (NO_2)

4.2 DDC undertakes monitoring within its administrative boundary using a network of automatic monitoring locations and diffusion tubes. The closest monitoring location to the proposed development Site is located outside Sholden Church of England Primary School on London Road (DV36), approximately 70m from the Site. Monitoring at DV36 commenced in 2019.

4.3 Bias adjusted NO_2 monitoring results, for the location in the vicinity of the proposed development Site, are detailed in **Table 4.1.**

Table 4.1: DDC NO_2 Monitoring Data in 2019

Location	Grid Reference		Monitoring Site Type	Monitored Annual Average Concentration ($\mu g.m^{-3}$)
				2019
Sholden Church of England Primary School (DV36)	635696	152325	Roadside	18.5

4.4 The monitored concentration at Sholden Primary School in 2019 was well below the annual mean air quality objective for NO_2 of 40$\mu g.m^{-3}$. Monitoring at DV36 commenced in October 2019 and data capture for the year was below 75%, the data has been annualised using Defra guidance[11]. There are no other representative monitoring locations close to the proposed development Site and DV36 was utilised in the model verification process detailed in **Appendix E**.

Particulate Matter (PM_{10})

4.5 DCC undertake PM_{10} monitoring in Dover, approximately 12km south west of the Site. Annual mean PM_{10} concentrations in Dover were below the annual mean objective for the past five years. Monitoring in Dover is not considered representative of conditions at the Site as Dover is a busy town and shipping port whereas Sholden is located in a rural setting, away from areas influenced by emissions associated with port operations.

Particulate Matter ($PM_{2.5}$)

4.6 No $PM_{2.5}$ monitoring undertaken by DCC within their administrative area.

Background Pollutant Concentrations

4.7 No background air quality monitoring is undertaken by DCC within the study area or the wider Sholden area. Background pollutant concentrations were therefore obtained from the latest Defra background concentration maps[19], which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2018 monitoring and meteorological data. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were obtained for the grid squares covering the study area for the years of assessment (2019, 2020 and 2024). The background concentrations used in the assessment are detailed in **Table 4.2.**

Table 4.2: Background Pollutant Concentrations used in the Assessment

Pollutant	Grid Square	Receptors	Concentration (µg.m^{-3})		
			2019	2020	2024
NO_2	635500, 153500	R3	8.4	8.1	7.2
PM_{10}			14.3	14.1	13.3
$PM_{2.5}$			9.0	8.8	8.2
NO_2	635500, 152500	R1 – R2, R4 – R8, R10 – R11, PR1 – PR9 and Diffusion Tube DV36	9.0	8.7	7.7
PM_{10}			14.9	14.7	13.9
$PM_{2.5}$			9.4	9.2	8.6
NO_2	636500, 152500	R12, R18	9.7	9.4	8.3
PM_{10}			15.1	14.8	14.1
$PM_{2.5}$			9.9	9.7	9.1
NO_2	635500, 151500	R9	8.8	8.6	7.6
PM_{10}			15.1	14.9	14.2
$PM_{2.5}$			9.6	9.5	8.9
NO_2	636500, 151500	R13 – R17, R19 – R20	10.0	9.7	8.6
PM_{10}			15.0	14.8	14.0
$PM_{2.5}$			10.2	10.1	9.5

4.8 2019, 2020 and 2024 background concentrations are below the relevant annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$.

4.9 The PM_{10} background concentrations are higher than NO_2 due to the influence of sea salt which comprises a large proportion of the PM_{10} concentrations.

5. CONSTRUCTION PHASE ASSESSMENT

5.1 The construction phase of the proposed development will involve a number of activities which have the potential to impact on local air quality. These include emissions of dust generated through demolition, excavation, construction, earthworks and trackout activities, exhaust pollutant emissions from construction traffic on the local highways network, and exhaust emissions from non-road mobile machinery (NRMM) within the construction site itself.

5.2 The location of sensitive receptors in relation to construction activities will affect the potential for such construction activities to cause dust soiling, nuisance and local air quality impacts. Meteorological conditions and the use of control measures will also contribute to the effects experienced.

Step 1: Screen the Need for a Detailed Assessment

5.3 Step 1 of the IAQM guidance[12] involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.

5.4 In accordance with the guidance, a detailed assessment is required if:

- Human receptors are located within 350m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances; or
- Ecological receptors are located within 50m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances.

5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[21], no ecological designations were identified within 50m of the proposed development and therefore the impact on ecological designations was not considered further. However, human receptors are located within 350m of the Site boundary, with the closest of these receptors located off Hall Crescent, Sandwich Road and Mongeham Road. A construction phase assessment was therefore undertaken.

Step 2: Assess the Risk of Dust Impacts

Step 2A: Define the Potential Dust Emission Magnitude

5.6 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance[12]. Demolition is not proposed as part of the development and therefore wasn't considered further in the assessment. The criteria and the dust emission magnitude defined for the proposed development are detailed in **Table 5.1**.

[21] Defra, Multi Agency Geographic Information for the Countryside (MAGIC) [http://magic.defra.gov.uk/]

Table 5.1: Dust Emission Magnitude Criteria and Definition

Activity	IAQM Dust Emission Magnitude	IAQM Dust Emission Magnitude Criteria	Project Defined Dust Emission Magnitude
Earthworks	Large	Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.	Large: Total Site area is greater than 10,000m^2.
	Medium	Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4m - 8m in height, total material moved 20,000 tonnes – 100,000 tonnes.	
	Small	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <20,000 tonnes, earthworks during wetter months.	
Construction	Large	Total building volume >100,000m^3, on site concrete batching, sandblasting.	Large: Total building volume greater than 100,000m^3.
	Medium	Total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.	
	Small	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).	
Trackout	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m.	Medium: 10 - 50 HDV movements anticipated per day.
	Medium	10 - 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m.	
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.	

Step 2B: Define the Sensitivity of the Area

5.7 The sensitivity of the study area takes into account the specific receptors in the vicinity of the Site, the proximity and number of those receptors, the local background concentration of PM_{10} and site-specific factors. **Figure 5.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance[12] for determining receptor sensitivity. The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling, human health and ecological impacts and these are presented in **Table 5.2**.

Table 5.2: Determination of the Sensitivity of the Area

Potential Impact	Justification	Sensitivity		
		Earthworks	Construction	Trackout
Dust Soiling	There are 10 - 100 highly sensitive receptors within 20m of the proposed development.	High	High	High
Human Health	There are 10 - 100 highly sensitive receptors within 20m of the proposed development. The 2020 background concentration of PM_{10} is less than 24µg.m^{-3}.	Low	Low	Low

Figure 5.1: Construction Phase Assessment Dust Distance Buffers

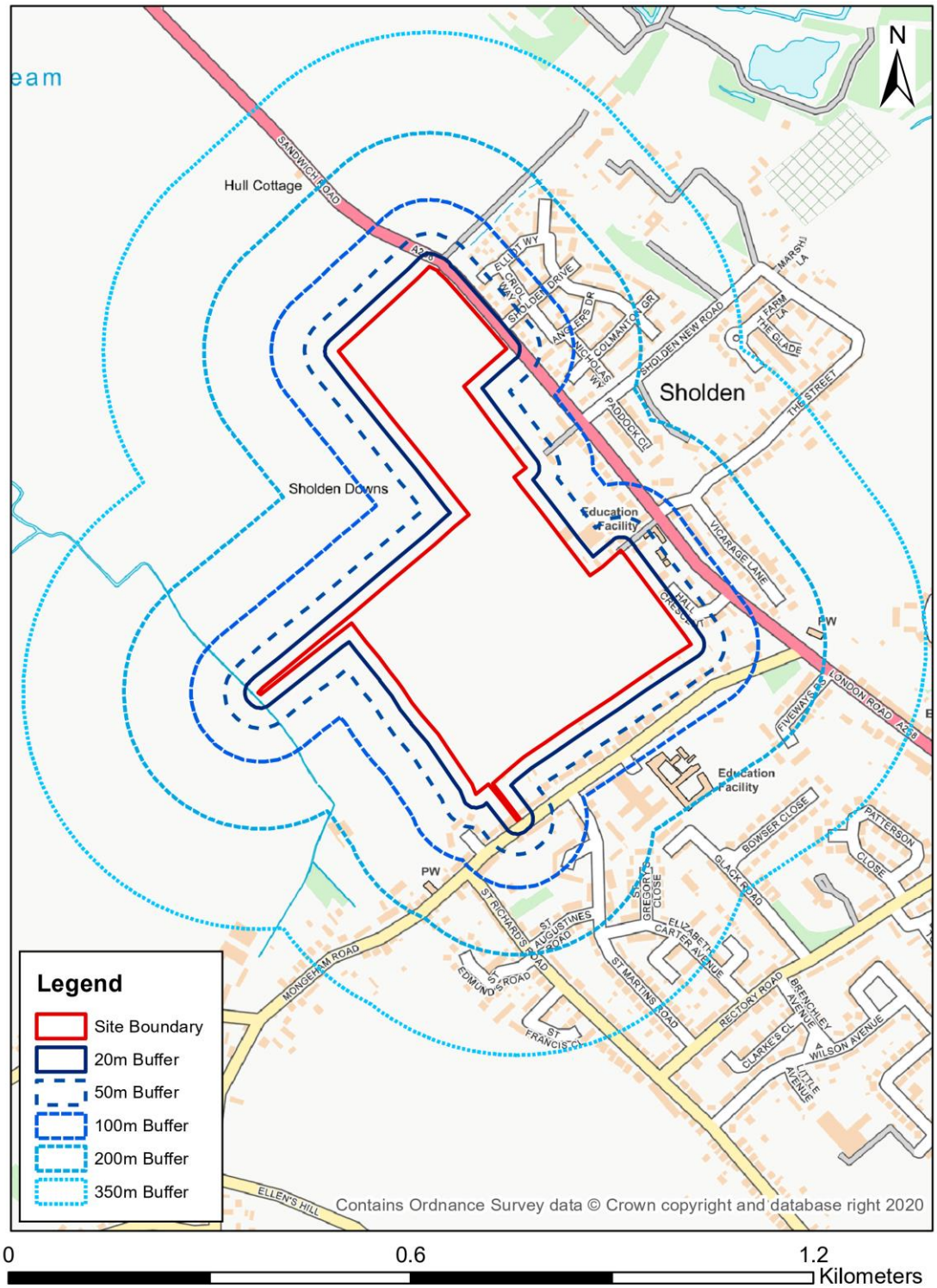

Figure 5.1 Construction Phase Dust Assessment Distance Buffers

Drawn by: ET
Date: 18/11/2020

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

Step 2C: Define the Risk of Impacts

5.8 The dust emission magnitude determined in Step 2A is then combined with the sensitivity of the area determined in Step 2B to define the risk of dust impacts with no mitigation applied. The results of this assessment are detailed in **Table 5.3.**

Table 5.3: Summary Dust Risk Table to Define Site Specific Risk

Activity	Step 2A: Dust Emission Magnitude	Step 2B: Sensitivity of the Area	Step 2C: Risk of Dust Impacts
Dust Soiling Effects on People and Property			
Earthworks	Large	High	High Risk
Construction	Large	High	High Risk
Trackout	Medium	High	Medium Risk
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Medium	Low	Low Risk

Step 3: Site-Specific Mitigation

5.9 The risk of dust impacts defined in Step 2C is used to determine the measures required to mitigate construction phase dust impacts. The mitigation measures are detailed in **Section 7** of this report.

Step 4: Determine Significant Effects

5.10 In accordance with IAQM guidance[12], with the implementation of the mitigation measures detailed in **Section 7**, the residual impacts from the construction phase are considered to be 'not significant'.

6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT

Existing Receptor Locations

6.1 Existing receptor locations were identified within close proximity of the road links detailed in paragraph 3.8 and considered in the operational phase road traffic emissions assessment. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the identified existing receptor locations for the assessment scenarios detailed in paragraph 3.7.

6.2 Where possible the closest receptors to those road links were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the proposed development. The greatest changes in pollutant concentrations were south of the development as traffic is expected to primarily travel towards Deal to the south of the Site, therefore receptors were selected on road links with the highest changes in traffic flow.

6.3 Receptors heights were modelled at 1.5m. This excludes schools, which were modelled at 1.0m to represent lower than average child breathing height. Receptor R8 was modelled at 0m to account for the elevation of the road above the receptor.

6.4 The existing receptor locations are detailed in **Table 6.1** and **Figure 6.1.**

Table 6.1: Existing Sensitive Receptor Locations

Receptor	Grid Reference		Details	Height (m)
	X	Y		
R1	635428	152679	Residential dwelling on Elliot Way	1.5
R2	635163	152854	Residential dwelling on Sandwich Road	1.5
R3	634968	153139	Residential dwelling on Sandwich Road	1.5
R4	635544	152496	Residential dwelling on London Road	1.5
R5	635688	152330	Sholden C of E Primary School, London Road	1.0
R6	635673	152349	Aspen Lodge Residential Care Home, London Road	1.5
R7	635832	152126	Sholden Hall Residential Retreat on London Road	1.5
R8	635862	152194	Residential dwelling on Vicarage Lane	0.0
R9	635673	151975	Hornbeam Primary School, Mongeham Road	1.0
R10	635926	152107	Residential dwelling on Fiveways Rise	1.5

Receptor	Grid Reference		Details	Height (m)
	X	Y		
R11	635957	152116	Residential dwelling on London Road	1.5
R12	636248	152021	Warden House Primary School, Birdwood Ave	1.0
R13	636253	151906	Residential dwelling on Manor Road	1.5
R14	636220	151915	Residential dwelling on London Road	1.5
R15	636316	152000	St Winifred's Care Home,	1.5
R16	636305	151975	Residential dwelling on Warden House Mews	1.5
R17	636290	151946	Residential dwelling on London Road	1.5
R18	636794	152089	Victoria Walmer & District War Memorial Hospital	1.5
R19	636335	151841	Residential dwelling on Manor Road	1.5
R20	636423	151774	Residential dwelling on Manor Road	1.5

Figure 6.1: Existing Receptor Locations

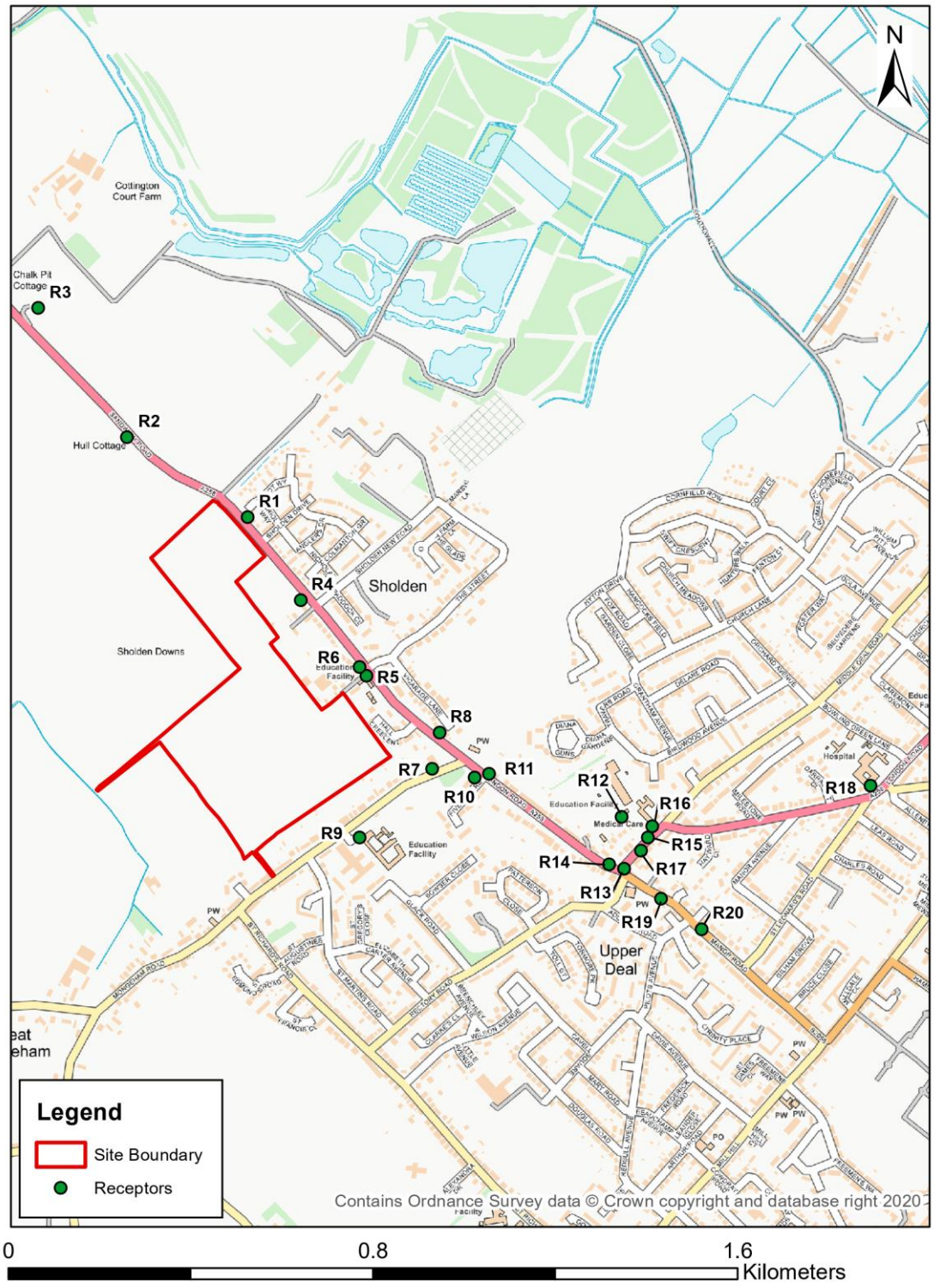

Figure 6.1 Road Traffic Emissions Assessment Existing Receptors

Drawn by: ET
Date: 18/11/2020

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

Proposed Receptor Locations

6.5 Pollutant concentrations were predicted across the proposed development Site to consider exposure of future residents of the proposed development to air quality. Proposed receptor locations were selected to represent the worst-case exposure locations of future residents at proposed dwellings closest to Sandwich Road, London Road and Mongeham Road. Pollutant concentrations were predicted at the proposed development Site for Scenario 4: 2024 Opening Year with development at those locations detailed in **Table 6.2** and shown in **Figure 6.2**.

Table 6.2: Proposed Sensitive Receptor Locations

Proposed Receptor	Grid Reference	
	X	Y
PR1	635360	152685
PR2	635386	152654
PR3	635398	152642
PR4	635442	152591
PR5	635443	152465
PR6	635512	152336
PR7	635662	152229
PR8	635721	152152
PR9	635571	152047

Figure 6.2: Proposed Receptor Locations

Figure 6.2 Road Traffic Emissions Assessment Proposed Receptors

Drawn by: ET
Date: 18/11/2020

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

Baseline Assessment

6.6 Pollutant concentrations were predicted at the identified existing sensitive receptor locations using the dispersion model ADMS-Roads. Predicted pollutant concentrations for Scenario 2: 2020 Base Year and Scenario 3: 2024 Opening Year without development are detailed in **Table 6.3.**

Table 6.3: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2020 Base Year and Scenario 3: 2024 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 2: 2020 Base Year (µg.m^{-3})			Scenario 3: 2024 Opening Year Without Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	18.3	16.8	10.4	14.9	16.3	9.9
R2	16.1	16.3	10.1	13.1	15.7	9.6
R3	11.4	14.8	9.2	9.6	14.1	8.6
R4	13.6	15.7	9.8	11.4	15.1	9.2
R5	15.9	16.2	10.1	13.1	15.6	9.5
R6	15.7	16.2	10.1	13.0	15.6	9.5
R7	14.0	15.8	9.8	11.6	15.2	9.3
R8	20.8	17.3	10.7	16.8	16.8	10.2
R9	10.5	15.3	9.7	9.1	14.6	9.1
R10	15.4	16.1	10.0	12.6	15.5	9.5
R11	22.0	17.6	10.9	17.5	17.1	10.3
R12	12.3	15.4	10.1	10.4	14.7	9.5
R13	33.2	19.7	12.9	25.9	19.3	12.4
R14	31.5	19.4	12.7	24.8	19.0	12.2
R15	17.9	16.5	11.1	14.5	15.9	10.5
R16	22.4	17.5	11.6	17.8	16.9	11.1
R17	24.2	17.9	11.9	19.2	17.3	11.3

Receptor	Scenario 2: 2020 Base Year (µg.m^{-3})			Scenario 3: 2024 Opening Year Without Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R18	16.1	16.3	10.5	13.2	15.6	10.0
R19	20.1	17.0	11.3	16.2	16.4	10.8
R20	21.3	17.3	11.5	17.0	16.7	10.9

6.7 The baseline assessment for Scenario 2 and Scenario 3 indicates that predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below the respective annual mean air quality objectives at the receptors considered.

6.8 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[11] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.15 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Assessment

Detailed Operational Phase Road Traffic Emissions Assessment

6.9 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations for Scenario 4: 2024 Opening Year with development, to consider the impact of development-generated vehicles on local air quality.

6.10 Predicted pollutant concentrations are detailed in **Tables 6.4**, **6.5** and **6.6** for NO_2, PM_{10} and $PM_{2.5}$ respectively together with Scenario 3: 2024 Opening Year without development concentrations for comparison purposes. The predicted change in pollutant concentrations, resulting from development-generated traffic, and the associated impact are also provided.

Table 6.4: Predicted Annual Mean NO_2 Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted NO_2 Concentration (µg.m^{-3})			Impact
	Scenario 3: 2024 Without Development	Scenario 4: 2024 With Development	Change*	
R1	14.9	15.5	+0.6	Negligible
R2	13.1	13.2	+0.1	Negligible
R3	9.6	9.6	+0.1	Negligible

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2024 Without Development	Scenario 4: 2024 With Development	Change*	
R4	11.4	11.6	+0.3	Negligible
R5	13.1	13.5	+0.4	Negligible
R6	13.0	13.3	+0.4	Negligible
R7	11.6	11.8	+0.2	Negligible
R8	16.8	17.4	+0.6	Negligible
R9	9.1	9.1	+0.1	Negligible
R10	12.6	12.9	+0.3	Negligible
R11	17.5	18.0	+0.5	Negligible
R12	10.4	10.5	+0.1	Negligible
R13	25.9	26.6	+0.6	Negligible
R14	24.8	25.5	+0.8	Negligible
R15	14.5	14.7	+0.2	Negligible
R16	17.8	18.1	+0.3	Negligible
R17	19.2	19.5	+0.3	Negligible
R18	13.2	13.3	+0.1	Negligible
R19	16.2	16.5	+0.3	Negligible
R20	17.0	17.4	+0.4	Negligible

** Discrepancies in changes due to rounding effects*

Table 6.5: Predicted Annual Mean PM_{10} Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM_{10} Concentration ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2020 Without Development	Scenario 4: 2020 With Development	Change*	
R1	16.3	16.5	+0.2	Negligible
R2	15.7	15.8	0.0	Negligible
R3	14.1	14.1	0.0	Negligible
R4	15.1	15.2	+0.1	Negligible
R5	15.6	15.7	+0.1	Negligible
R6	15.6	15.7	+0.1	Negligible
R7	15.2	15.2	+0.1	Negligible
R8	16.8	17.0	+0.2	Negligible
R9	14.6	14.6	0.0	Negligible
R10	15.5	15.6	+0.1	Negligible
R11	17.1	17.2	+0.2	Negligible
R12	14.7	14.7	0.0	Negligible
R13	19.3	19.5	+0.2	Negligible
R14	19.0	19.3	+0.3	Negligible
R15	15.9	15.9	+0.1	Negligible
R16	16.9	17.0	+0.1	Negligible
R17	17.3	17.4	+0.1	Negligible
R18	15.6	15.6	0.0	Negligible
R19	16.4	16.5	+0.1	Negligible
R20	16.7	16.8	+0.1	Negligible

** Discrepancies in changes due to rounding effects*

Table 6.6: Predicted Annual Mean $PM_{2.5}$ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2024 Without Development	Scenario 4: 2024 With Development	Change*	
R1	9.9	10.0	+0.1	Negligible
R2	9.6	9.6	0.0	Negligible
R3	8.6	8.6	0.0	Negligible
R4	9.2	9.3	0.0	Negligible
R5	9.5	9.6	+0.1	Negligible
R6	9.5	9.6	+0.1	Negligible
R7	9.3	9.3	0.0	Negligible
R8	10.2	10.3	+0.1	Negligible
R9	9.1	9.1	0.0	Negligible
R10	9.5	9.5	0.0	Negligible
R11	10.3	10.4	+0.1	Negligible
R12	9.5	9.5	0.0	Negligible
R13	12.4	12.5	+0.1	Negligible
R14	12.2	12.4	+0.1	Negligible
R15	10.5	10.5	0.0	Negligible
R16	11.1	11.1	0.0	Negligible
R17	11.3	11.4	+0.1	Negligible
R18	10.0	10.0	0.0	Negligible
R19	10.8	10.8	+0.1	Negligible
R20	10.9	11.0	+0.1	Negligible

** Discrepancies in changes due to rounding effects*

6.11 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 3: 2024 Opening Year without development and Scenario 4: 2024 Opening Year with development are below the relevant annual mean air quality objectives at all receptors.

6.12 The proposed development does not lead to any additional exceedances of the annual mean air quality objectives.

6.13 Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are less than 2.0% of the relevant annual mean air quality objectives and total pollutant concentrations are less than 75% of the annual mean air quality objectives. It was therefore considered that the impact of the proposed development on local air quality was negligible in accordance with IAQM and EPUK guidance[13].

6.14 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[11] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.15 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Significance Summary

6.15 Relevant guidance and legislation and professional judgement was utilised to determine the significance of the air quality assessment. The air quality assessment was supervised by a full member of the Institute of Air Quality Management. A summary of the impact significance and justification of this are provided below.

6.16 The impact of the proposed development on air quality is considered to be 'Negligible':

- Consideration was given to local planning policy[8] and the development proposals are considered to be in accordance with this policy with regard to air quality.
- Existing concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the study area are predicted to be below the relevant air quality objectives.
- The air quality assessment undertaken utilised robust model inputs including slowing traffic sections at junctions, appropriate meteorological data and surface roughness and cumulative traffic flows. In addition, the development-generated vehicle movements utilised in the assessment were from a previous masterplan iteration which included 250 dwellings. The reduction in the proposed dwelling numbers will result in less development-generated vehicles on the local road network.
- The impact of development-generated road traffic on local air quality is defined as negligible in accordance with IAQM and EPUK guidance[13].
- In addition, a sensitivity analysis was undertaken and provided in **Appendix F** considering the conservative scenario of NOx concentrations not decreasing from baseline levels in line with projected emission factors. The findings of this sensitivity analysis also predicted the impact of development-generated road traffic on local air quality as negligible overall in accordance with IAQM and EPUK guidance[13].

Site Suitability Assessment

6.17 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the proposed residential dwellings within the proposed development Site for Scenario 4: 2024 Opening Year with development. Predicted pollutant concentrations are detailed in **Table 6.7**.

Table 6.7: Predicted Annual Mean NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Proposed Receptor Locations

Receptor	Scenario 4: 2024 Opening Year with development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$
PR1	10.1	14.7	9.0
PR2	10.6	14.9	9.1
PR3	10.8	14.9	9.1
PR4	10.0	14.7	9.0
PR5	8.5	14.2	8.7
PR6	8.4	14.2	8.7
PR7	8.8	14.3	8.8
PR8	8.9	14.3	8.8
PR9	8.4	14.2	8.7

6.18 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 4: 2024 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2024 with the development in place.

6.19 With regard to short term air quality objectives for NO_2 and PM_{10} at the residential development, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[11] it may be assumed that exceedance of the 1-hour mean NO_2 objective are unlikely. The calculation detailed in paragraph 3.15 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

7. MITIGATION

Construction Phase Assessment

Step 3: Site-specific Mitigation

7.1 The risk of dust impacts, defined in Step 2C of the assessment, is used to determine the mitigation measures required to minimise the emission of dust during construction phase activities. The IAQM guidance[12] provides details of highly recommended and desirable mitigation measures which are commensurate with the risk of dust impacts defined in Step 2C for construction, earthworks and track out activities. Where the mitigation measures are general in nature, the highest risk category was applied in accordance with the guidance[12]. The highest risk category identified was 'High Risk' and the recommended mitigation taken from the IAQM guidance[12] is detailed in **Table 7.1** and **Table 7.2**.

Table 7.1: Mitigation Measures for a High Risk Site

Category	Mitigation Measures	
	Highly Recommended	Desirable
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	None
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager.	
	Display the head or regional office contact information.	
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.	None
	Make the complaints log available to the local authority when asked.	
	Record any exceptional incidents that cause dust and/or air emissions, either on-	

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
	or off-site, and the action taken to resolve the situation in the log book.	
	Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary.	None
	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	None
	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 extended 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.	