BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

ENVIRONMENT

AVANT HOMES (ENGLAND) LTD

MOORTHORPE BANK, OWLTHORPE

Air Quality Assessment

LDP2266

AVANT HOMES (ENGLAND) LTD

MOORTHORPE BANK, OWLTHORPE

AIR QUALITY ASSESSMENT

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

Cambridge
14-16 High Street, Histon, Cambridge
CB24 9JD
T: 01223 235 173

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

Market Harborough
12a Woodcock House, Compass Point Market Harborough, Leicestershire, LE16 9HW
T: 01858 455020

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

APRIL 2020

DOCUMENT ISSUE RECORD

Document Number:	MWM-BWB-ZZ-ZZ-RP-LA-0001_AQA_S0_P03
BWB Reference:	LDP2266-003

Revision	Date of Issue	Status	Author:	Checked:	Approved:
P01.1	10/03/2019	S0	P. Hayward MSc, BSc (Hons), MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc/ J. MacQueen BA (Hons)
P01.1	21/05/2019	S4	P. Hayward MSc, BSc (Hons), MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc/ J. MacQueen BA (Hons)
P02.0	28/11/2019	Issue	P. Hayward MSc, BSc (Hons), MIAQM, MIEnvSc / F. Hoyle MSc, BSc (Hons), AIAQM, AMIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc/ J. MacQueen BA (Hons)
P02.1	17/02/2020	Issue	P. Hayward MSc, BSc (Hons), MIAQM, MIEnvSc / F. Hoyle MSc, BSc (Hons), AIAQM, AMIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc/ J. MacQueen BA (Hons)
P03.0	24/04/2020	Final	P. Hayward MSc, BSc (Hons), MIAQM, MIEnvSc / F. Hoyle MSc, BSc (Hons), AIAQM, AMIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc/ J. MacQueen BA (Hons)

Notice

EXECUTIVE SUMMARY

BWB Consulting Ltd was appointed by Avant Homes (England) Ltd to undertake an air quality assessment for a proposed residential development at Moorthorpe Bank, Owlthorpe.

The proposed development Site is located within the administrative area of Sheffield City Council and lies 7.5km to the south of the city centre. The Site is located within the Sheffield Citywide Air Quality Management Area which is designated for the potential exceedance of the annual mean air quality objective for nitrogen dioxide (NO_2) and the 1-hour and annual mean objectives for particulate matter (PM_{10}).

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.

Road traffic emissions were assessed using an emissions cost approach, in accordance with Defra guidance. The total emissions that the proposed development will generate over a five year period was calculated using estimated traffic flows for the operational phase. A cost to be offset by appropriate mitigation measures was then calculated using Defra values for the impacts on human health associated with NOx and $PM_{2.5}$. Mitigation was then detailed appropriate to the calculated emissions cost.

CONTENTS

FIGURES

APPENDICES

1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting was appointed by Avant Homes (England) Ltd to undertake an air quality assessment for a proposed residential development at Land off Moorthorpe Bank, Owlthorpe, Sheffield ('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. For the operational phase, an emissions mitigation assessment was undertaken to consider the type and extent of mitigation measures that should be implemented to minimise emissions during the operation of the proposed development.

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 between Owthorpe and Moorthorpe, 7.5km to the south of Sheffield city centre and within the administrative area of Sheffield City Council (SCC). **Figure 1.1** details the location of the proposed development. The Site currently comprises vacant grassland.

1.5 The Site is surrounded in all directions by a mixture of open grassland and woodland. The site wraps around Owlthorpe Surgery on its eastern boundary. There is an existing residential area 15m to the south of the Site boundary.

1.6 Principal air pollution sources in the vicinity of the development are likely to comprise local roads. However, there are no major roads close to the Site, the nearest being the A57 Donetsk Way, 250m to the north. The Site is located within the Sheffield Citywide Air Quality Management Area (AQMA), which was designated for the potential exceedance of the annual mean air quality objective for nitrogen dioxide (NO_2) and the 1-hour and annual mean objectives for particulate matter (PM_{10}).

Proposed Development

1.7 The proposed development comprises 74 residential dwellings plus highways access and landscaping.

1.8 The proposed development layout is included in **Appendix B**.

Figure 1.1: Site Location

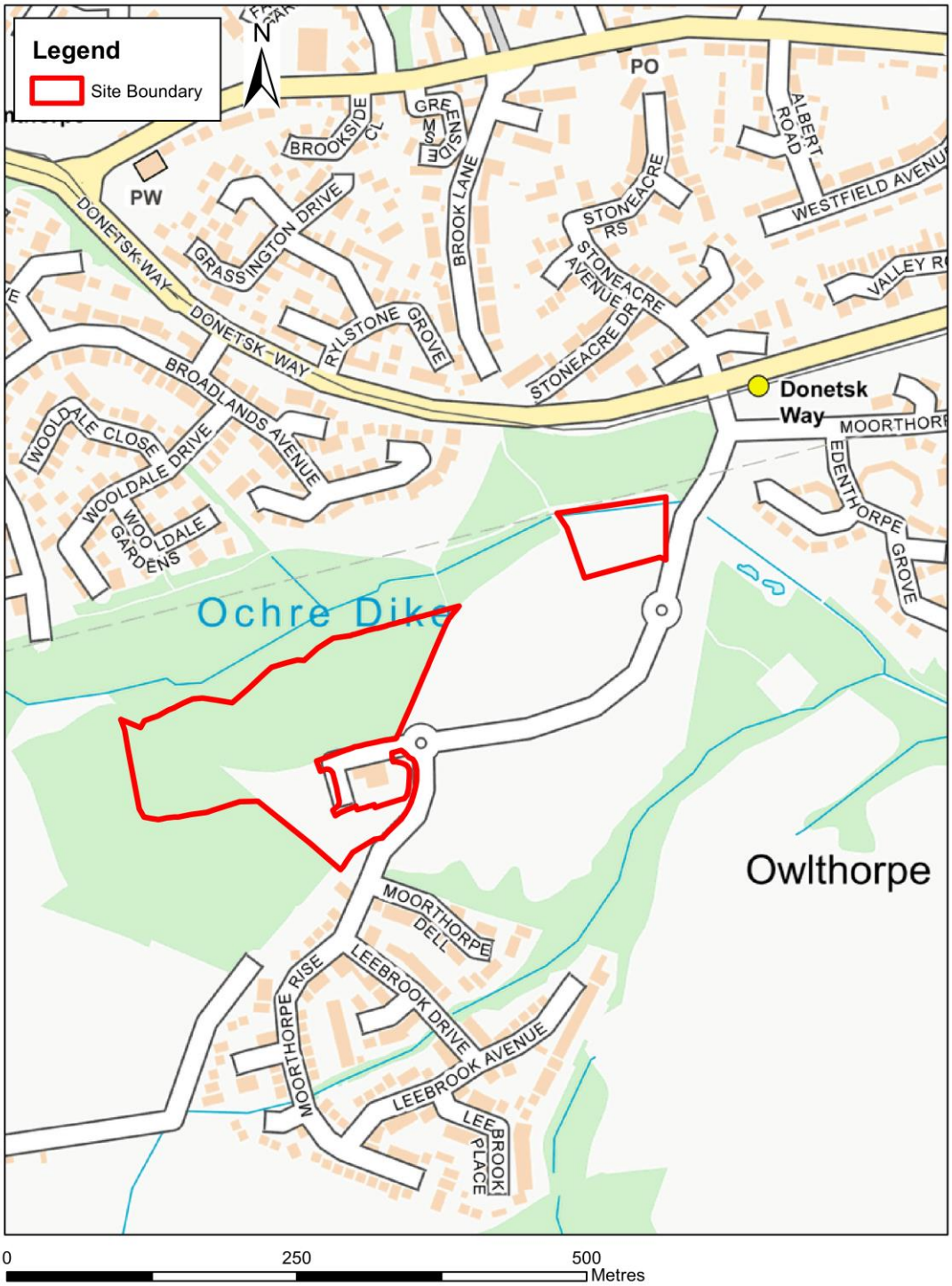

Figure 1.1: Site Location

Drawn by: FH
Date: 28/11/2019

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

2. LEGISLATION AND PLANNING POLICY

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.
>
> […]"

[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

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

> "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:

- *"What air quality considerations does planning need to address;*
- *What is the role of plan-making with regard to air quality;*

[7] Department for Communities and Local Government (2019) Planning Practice Guidance 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*
- *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 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

Sheffield Local Development Framework

2.13 The Sheffield Core Strategy (2009)[8] provides the overall spatial strategy for the Framework and sets out SCC's policies and proposals for the use and development of land and buildings. Policy CS 66 relates specifically to air quality:

"Policy CS 66

Air Quality

Action to protect air quality will be taken in all areas of the city. Further action to improve air quality will be taken across the built-up area, and particularly where residents in road corridors with high levels of traffic are directly exposed to levels of pollution above national targets".

2.14 Planning applications for uses which give rise to significant volumes of traffic will, in particular, be scrutinised with regard to the city's AQAP[9] and Clean Air Strategy[10].

2.15 The above policies were taken into consideration throughout the undertaking of the assessment.

[8] SCC (2009) Local Development Framework – Core Strategy
[9] SCC (2015) Air Quality Action Plan
[10] SCC (2017) Clean Air Strategy

3. METHODOLOGY

Consultation with Sheffield City Council

3.1 Consultation was undertaken with the City Growth Services department at SCC, in which the proposed assessment methodology was discussed via telephone and provided via email[11].

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 – An estimated trip generation for the proposed development was obtained from the BWB's Transport Planning team, the project's Transport Consultants. An emissions cost calculation was then undertaken following West Yorkshire Low Emissions Strategy (WYLES)[13] and Defra guidance[14] to estimate the total emissions of NO_2 and $PM_{2.5}$ generated by traffic from the proposed development over a five year period and the amount the amount of mitigation required to offset these emissions.

3.3 During the discussion[11], it was indicated that a dispersion modelling assessment of vehicle emissions associated with the proposed development would not be required, as despite being within the Citywide AQMA, the Site is on the edge of the conurbation in a semi-rural area and the scale of the development is relatively small. It was also observed that, despite being on the edge of the City, the Site is well served by public transport, with the Donetsk Way tram stop located 450m to the north-east of the Site, providing a direct link to the city centre. As such significant impacts from development-generated vehicle traffic on existing receptors were not considered likely.

3.4 Furthermore the Site is located over 200m from any significant roads and is therefore not likely to experience pollutant concentrations that are elevated significantly above background levels. The suitability of the Site for the proposed residential use with regard to air quality, was therefore not considered a concern. As such, the air quality assessment focusses on minimising pollutant emissions from the development during its construction and operation through the implementation of appropriate mitigation measures.

Construction Phase Assessment

3.5 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 are provided below:

[11] Consultation with SCC: assessment scope agree via telephone and followed up via email on 14/02/2019 and 21/02/2019.
[12] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London
[13] West Yorkshire Local Authorities (2012) Air Quality & Emissions Technical Planning Guidance.
[14] Defra (January 2019) Air Quality Damage Cost Guidance.

- 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;
    - 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 – Emissions Cost Calculation

3.6 During consultation with SCC[11], a method was requested to assess the volume of emissions generated by the proposed development, in order to establish the type and quantum of mitigation reasonably required.

3.7 SCC has not yet adopted specific guidance for the quantification of emissions impacts, but an abatement/damage cost approach is becoming increasingly adopted in the UK.

3.8 A detailed 'damage' cost approach is provided in the Defra guidance[14]. This quantifies, monetarily, the impact that emissions of the key pollutants of concern (NOx and $PM_{2.5}$) for road traffic are expected to have on human health, assigning a cost per tonne for each pollutant dependant on the environment into which it is being released (i.e. how urban the vicinity is).

3.9 Road Transport Emission Increase (cost, £) = Estimated trip rate for 5 years x Emission rate per 10km per vehicle type x Damage costs

3.10 A 2% uplift per annum is then added to the cost to reflect the assumption that willingness to pay for health will rise in line with economic growth.

3.11 The emission rate for the cost calculation is derived from the latest Defra Emissions Factor Toolkit[15] (version 9.0.1), which itself requires the following input data:

- Road Type;
- Development generated daily traffic flow for Light Duty Vehicles (LDV);
- Development generated daily traffic flow for Heavy Duty Vehicles (HDV) – vehicles >3.5T;
- Emissions year;
- Average speed; and
- Link length (usually assumed to be 10km).

[15] Defra Emissions Factor Toolkit. https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html.

3.12 BWB Consulting's Transport Planning team estimated the number of additional visitors to the Site and the mode of transport that they would use, based on the proposed Site Layout as included in **Appendix B**. It was indicated that there will be an additional 394 24-hour Annual Average Daily Traffic (AADT) LDV trips. It is not anticipated that the proposed development would lead to a significant change in HDV flows.

3.13 A number of the inputs required for the emissions cost calculation are based on assumptions and as such the resulting cost should be treated with caution. However, it can give an indication of the scale of a development in terms of total transport emissions and therefore be used to determine the level of mitigation that may be appropriate.

3.14 Normally costs established in this way are apportioned to low emissions measures associated with the assessed development. In doing this it may be possible for the calculated costs to be offset by accounting for them within a development's intrinsic low emissions measures, and/or measures embedded within the development's Transport Plan.

4. CONSTRUCTION PHASE ASSESSMENT

4.1 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.

4.2 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

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

4.4 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.

4.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[16], 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 Moorthorpe Rise. A construction phase assessment was therefore undertaken.

Step 2: Assess the Risk of Dust Impacts

Step 2A: Define the Potential Dust Emission Magnitude

4.6 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. These criteria and the dust emission magnitude defined for the proposed development are detailed in **Table 4.1**.

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

Table 4.1: 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 >10,000m^3
	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.	Medium: Estimated building volume of circa 40,000m^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 outward 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

4.7 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. 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 4.2**. A plan showing the key distance buffers detailed in the IAQM guidance[12] is included in **Figure 4.1**.

Figure 4.1: Construction Phase Buffers

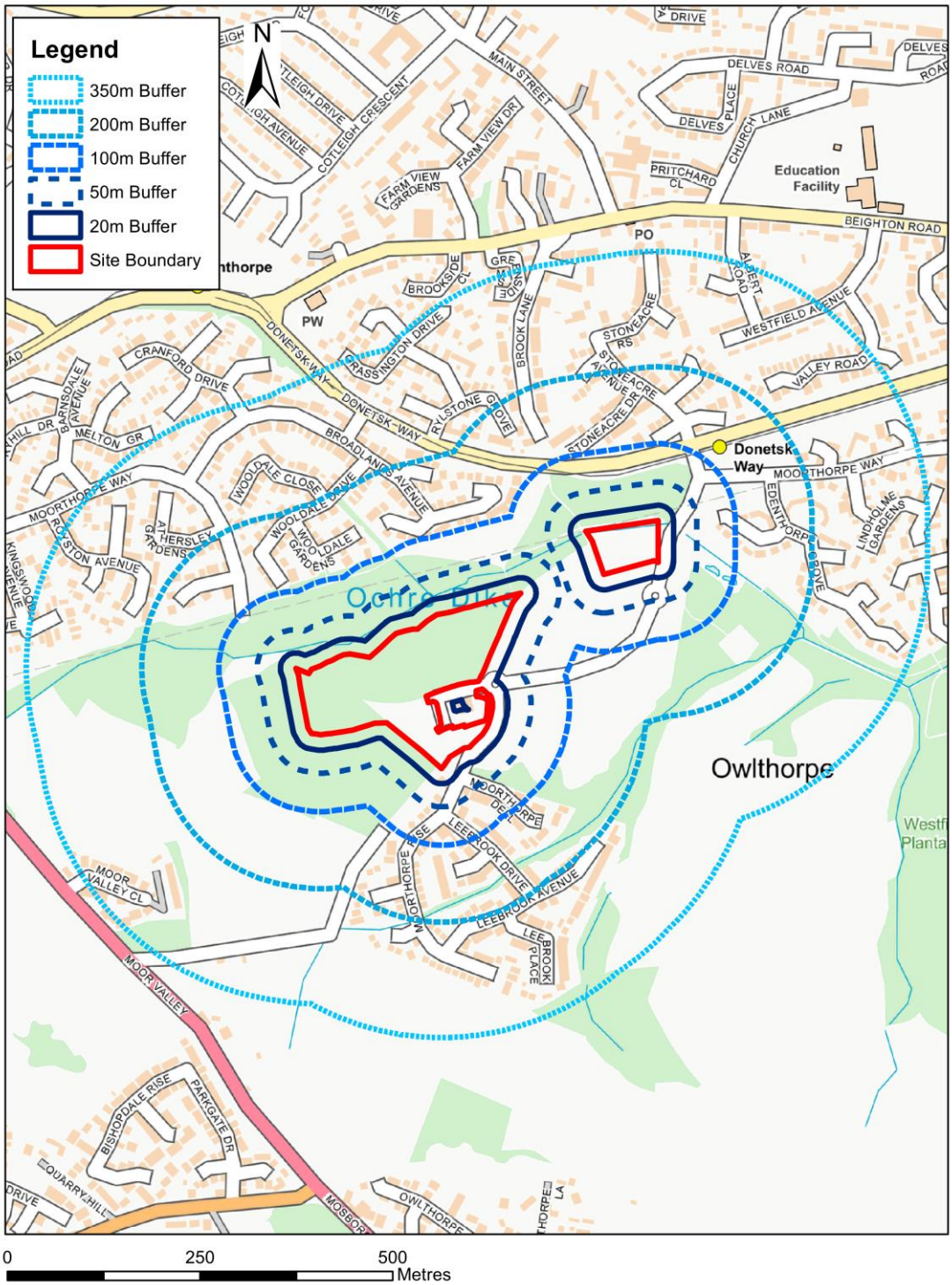

Figure 4.1: Construction Dust Buffers
Drawn by: FH
Date: 28/11/2019

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

Table 4.2: Determination of the Sensitivity of the Area

Potential Impact	Justification	Sensitivity		
		Earthworks	Construction	Trackout
Dust Soiling	There are anticipated to be 1-10 highly sensitive receptors within 20m of the proposed development including Owlthorpe Surgery and the closest residential properties.	Medium	Medium	Medium
Human Health	There are anticipated to be 1-10 highly sensitive receptors within 20m of the proposed development The 2017 background concentration of PM_{10} is less than 24µg.m^{-3}[17].	Low	Low	Low

Step 2C: Define the Risk of Impacts

4.8 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 4.3**.

Table 4.3: 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	Medium	Medium Risk
Construction	Medium	Medium	Medium Risk
Trackout	Medium	Medium	Low Risk
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Medium	Low	Low Risk
Trackout	Medium	Low	Low Risk

[17] Defra Background Mapping Data [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015]

Step 3: Site-Specific Mitigation

4.9 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 6** of this report.

Step 4: Determine Significant Effects

In accordance with IAQM guidance[12], with the implementation of the mitigation measures detailed in **Section 6**, the residual impacts from the construction phase are considered to be 'not significant'.

5. OPERATIONAL PHASE ASSESSMENT – EMISSIONS COST CALCULATION

Input Data

5.1 The inputs that were used in the calculation of emissions costs are included in **Table 5.1**.

Table 5.1: Emissions Cost Calculation Inputs

EFT Input Factor	Value
Trip Rate (LDVs)	394
Trip Rate (HDVs)	0
Average Speed	38km.hr^{-1} – estimated speed on local roads allowing for congestion, provided by the transport consultants
Link Length	10km
Road Type	Urban Not London
Cost Per Tonne per Pollutant[18] for Road Transport Outer Conurbation (Central Estimate)	NOx = £10,844
	$PM_{2.5}$ = £203,359
Development transport emissions (Tonnes) from EFT	NOx = 0.33378
	$PM_{2.5}$ = 0.02560

Emissions Cost Calculation

5.2 The emissions cost calculation for the proposed development is included in **Table 5.2** and was undertaken using the formula detailed in paragraph 3.9.

Table 5.2: Existing Sensitive Receptor Locations

Year	NOx Emission Cost	$PM_{2.5}$ Emission Cost
1	0.33378 x £10,844 = £3,619.50	0.02560 x £203,359 = £5,206.85
2	x 1.02 (2%) = £3,691.89	x 1.02 (2%) = £5,310.99
3	x 1.02 (2%) = £3,765.73	x 1.02 (2%) = £5,417.21
4	x 1.02 (2%) = £3,841.05	x 1.02 (2%) = £5,525.55

[18] Defra. Damage costs by location and source. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/460398/air-quality-econanalysis-damagecost.pdf.

Year	NOx Emission Cost	$PM_{2.5}$ Emission Cost
5	x 1.02 (2%) = £3,917.04	x 1.02 (2%) = £5,636.06
TOTAL: £45,932.69		

5.3 The calculated value from **Table 5.2** of £45,932.69 should be used as an indication regarding the cost of measures to be implemented which will benefit local air quality.

6. MITIGATION

Construction Phase – Dust Emissions

Step 3: Site-specific Mitigation

6.1 The risk of dust impacts, defined in Step 2C of the assessment, are 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 'Medium Risk' and the recommended mitigation taken from the IAQM guidance[12] is detailed in **Table 6.1** and **Table 6.2**.

Table 6.1: Mitigation Measures for a Medium 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.	
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 and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	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

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
	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.	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.
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.	
Operating vehicle/ machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker with the agreement of the local authority, where appropriate).
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	None

Category	Mitigation Measures	
	Highly Recommended	Desirable
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-portable water where possible and appropriate.	
	Use enclose 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 and 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.	None

Table 6.2: Mitigation Measures Specific to Earthworks, Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	Desirable
Earthworks (High Risk Site)	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	None
	Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	
	Only remove the cover in small areas during work and not all at once.	
Construction (Medium Risk Site)	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.	Avoid scabbling (roughening of concrete surfaces) if possible.
		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 power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials	None

Category	Mitigation Measures	
	Highly Recommended	Desirable
(Medium Risk Site)	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 the sites are covered to prevent escape of materials during transport.	
	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	
	Record all inspections of haul routes and any subsequent action in a site log book.	
	Where applicable, install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	
	Access gates to be located at least 10m from receptors where possible.	

Operational Phase – Road Traffic Emissions

6.2 In accordance with relevant guidance[13], the emissions cost of £45,932.69, calculated in Section 5 of this report, should be attributed to mitigation to offset the emissions produced by development traffic.

6.3 A Travel Plan[19] was produced for the development and submitted with the planning application. This included a number of sustainable transport measures which should be implemented to support the use of sustainable travel modes, including walking, cycling, public transport and car sharing, thus helping to minimise emissions associated with the proposed development. These measures include:

- Appointment of a Travel Plan Coordinator;
- Provision of Travel Welcome Packs to residents of the proposed development;

[19] BWB Consulting Ltd (2019) Moorthorpe Gate, Owlthorpe: Travel Plan

- Promote cycling through:
  - Provision of cycle information, including maps of cycle routes;
  - Promoting cycle to work scheme;
  - Promoting cycling websites and smart phone applications;
- Promote walking through:
  - Provision of walking maps;
  - Promoting 'walking buddies';
  - Promoting walking websites and smart phone applications;
- Promote public transport through:
  - Potentially providing free or discounted bus tickets for residents;
  - Providing funding up to £65 per household for local bus services;
  - Providing residents with sources of public transport services, timetable and ticketing information;
  - Promoting relevant websites and smart phone applications; and
- Promote car sharing.

6.4 In addition, during consultation[11], SCC indicated that electric vehicle (EV) charging points should be included within the proposed development in order to encourage "zero emission" vehicles. The proposed development will provide 50% of the open market dwellings with an EV charging point or capability for EV charging installation in addition to providing a financial contribution to bus passes and other sustainable transport options to encourage the use of public or active transport over cars.

6.5 **Table 6.3** details the costs of the proposed mitigation measures.

Table 6.3: Mitigation Costs

Measure	Cost
Five years of Travel Plan monitoring	£10,000.00
Surveys associated with Travel Plan monitoring	£5,000.00
Travel Plan Co-Ordinator Fund (equivalent of £140.00 per household for contributions to sustainable travel initiatives)	£10,000.00
Welcome Pack costs	£5,000.00
Electric Vehicle charging (20% installation and 30% infrastructure)	£10,190.00
£65 contribution per household for Stagecoach Silver 28 Day Megarider	£4,810.00
TOTAL: £46,000.00	

7. CONCLUSIONS

7.1 BWB Consulting Limited was appointed by Avant Homes (England) Ltd to undertake an air quality assessment for a proposed development at land at Moorthorpe Bank in Owlthorpe, Sheffield.

7.2 A qualitative construction phase assessment was undertaken and measures were recommended for inclusion in a DMP to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance[12].

7.3 Road traffic emissions were assessed using an emissions cost approach, in accordance with WYLES[13] and IAQM and EPUK guidance[12]. The total emissions that the proposed development will generate over a five year period was calculated using estimated traffic flows for the operational phase. A cost to be offset by appropriate mitigation measures was then calculated using Defra values[14] for the impacts on human health associated with NOx and $PM_{2.5}$. Mitigation was then detailed appropriate to the calculated emissions cost.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Term	Definition
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV	Heavy Duty Vehicles, (HGVs + buses)
HGV	Heavy Goods Vehicles.
IAQM	Institute of Air Quality Management.
LAQM	Local Air Quality Management.
LDV	Light Duty Vehicles (motorbikes, cars, vans and small trucks)
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O_3	Ozone.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre ($\mu g.m^{-3}$)	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g.m^{-3}$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UK-AIR	UK Air Information Resource – A source of air quality information provided by Defra.
UKAQS	United Kingdom Air Quality Strategy.

APPENDIX B: PROPOSED DEVELOPMENT LAYOUT

House Type Name		Sq Ft	Beds	No. of Plots
Affordable Housing				
Helmsdale	Ter	745	2	4
Nithdale	Ter	903	3	6
Weydale	Ter	1,059	4	5
				15
Market Housing				
Easton	Det	881	3	6
Haddington	Semi	941	3	6
Haddington	Det	941	3	1
Kinnerton	Det	953	3	3
Paignton	Semi	1,228	3	4
Seaton	Semi	1,259	3	4
Denbury	Det	1,211	4	2
Finsbury	Det	1,221	4	2
Lathbury	Det	1,355	4	7
Napsbury	Det	1,450	4	8
Sudbury	Det	1,503	4	9
Ramsbury	Det	1,502	4	3
Chesham	Det	1,759	5	4
				59
Total				74

Key

Surface Water Attenuation

Existing Doctors Surgery

Indicative location of LEAP

Potential pedestrian link

Potential pedestrian link

Additional window to be added on side elevation

Broadlands

Moorthorpe Way

AVANT homes

nineteen47
CHARTERED TOWN PLANNERS & URBAN DESIGNERS

Project
Moorthorpe Way
Owthorpe

Drawing Title
Presentation Layout

Project Code	Drawing No	Rev	Drawing Scale
n1276	009	C	1:500 @ A0

0 10 20 m

BWB

BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

www.bwbconsulting.com