Air Quality Assessment

Millfield Works, Grangefield Road, Stockton on Tees

Presented to **TJ Thomson**

Issued: June 2018

Delta-Simons Project No. 18-0163.01

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Report Details

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Executive Summary

Site and Report Context	Delta-Simons, working with our approved technical specialist Redmore Environmental, was instructed by TJ Thomson to undertake the preparation of an Air Quality Assessment in support of the planning application for a residential development at the former Millfield Works, Grangefield Road, Stockton on Tees. The proposal comprises the development of 600 dwellings (Use Class C3) including elderly accommodation (Use Class C2) with associated works and a local centre (Use Class A1 and/or D1), with all matters reserved except for points of access." The proposal may lead to the exposure of future occupants to poor air quality, as well as adverse air quality impacts at sensitive locations as a result of fugitive dust emissions during construction and road vehicle exhaust emissions during operation. As such, an Air Quality Assessment was required to determine baseline conditions at the Site, consider its suitability for the proposed residential end-use and assess potential impacts associated with the scheme.
Summary	Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level. Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the Site. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the local highway network both with and without the development in place. Results were subsequently verified using local monitoring data. Review of the dispersion modelling results indicated that predicted air quality impacts as a result of traffic generated by the development were not significant at any sensitive location in the vicinity of the Site. The results of the assessment also indicated pollution levels were below the relevant criteria at all locations across the Site. As such, the location is considered suitable for the proposed residential end-use.
Conclusions and Recommendations	Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposal.
This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report.	

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited ("Delta-Simons"), working with our approved technical specialist Redmore Environmental Ltd, was instructed by TJ Thomson (the "Client") to undertake the preparation of an Air Quality Assessment in support of the planning application for a residential development at the former Millfield Works, Grangefield Road, Stockton on Tees (the "Site"). Reference should be made to Figure 1 for a map of the Site and surrounding area.

1.2 Context & Purpose

The proposals comprise outline planning permission for approximately 600 dwellings (Use Class C3) including elderly accommodation (Use Class C2) with associated works and a local centre (Use Class A1 and/or D1), with all matters reserved except for points of access.

The proposals have the potential to cause air quality impacts at sensitive locations. These may include fugitive dust emissions associated with construction works and road traffic exhaust emissions from vehicles travelling to and from the Site during the operational phase. Future residents may also be exposed to any existing air quality issues at the Site. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects as a result of the proposal.

1.3 Scope of Works

The scope of works undertaken for this assessment was:

- Baseline assessment - determination of existing air quality conditions in the vicinity of the Site;
- Construction phase assessment - determination of potential impacts as a result of dust emissions during the construction of the proposed development;
- Dispersion modelling - prediction of ambient pollutant concentrations at sensitive locations through dispersion modelling of atmospheric emissions from the local road network;
- Road vehicle exhaust emission assessment - calculation of the change in pollutant concentrations as a result of road vehicle exhaust emissions associated with traffic generated by the development during the operational phase to determine the potential for significant air quality impacts; and,
- Exposure assessment - comparison of predicted concentrations with the relevant criteria to determine the suitability of the Site for residential use.

1.4 Limitations

The standard limitations associated with this assessment are presented in Appendix A.

2.0 Legislation and Policy

2.1 European Directives

European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new Air Quality Limit Values (AQLVs) for particulate matter with an aerodynamic diameter of less than 2.5µm. The consolidated Directives include:

- Directive 1999/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

2.2 UK Legislation

The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 5 pollutants.

Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007[1]. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

Table 1 presents the AQOs for pollutants considered within this assessment.

Pollutant	Air Quality Objective	
	Concentration (µg/m^3)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum

[1] The AQS for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

Table 1: Air Quality Objectives

Table 2 summarises the advice provided in DEFRA guidance[2] on where the AQOs for pollutants considered within this report apply.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour Mean	All locations where the annual mean objectives would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour Mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

Table 2: Examples of Where Air Quality Objectives Apply

2.3 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs. Reference should be made to section 3.2 for a review of the LAQM process to date in the vicinity of the Site.

[2] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

2.4 Dust

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

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

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

2.5 National Planning Policy

The National Planning Policy Framework (NPPF)[3] was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to the proposed development:

"The planning system should contribute to and enhance the natural and local environment by: […]

Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

The implications of the NPPF have been considered throughout this assessment.

2.6 National Planning Practice Guidance

The National Planning Practice Guidance[4] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. Why should planning be concerned about air quality?
2. What is the role of Local Plans with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to a planning decision?
6. Where to start if bringing forward a proposal where air quality could be a concern?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

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[3] NPPF, Department for Communities and Local Government, 2012.
[4] http://planningguidance.planningportal.gov.uk.

9. How do considerations about air quality fit into the development management process?

These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.7 Local Planning Policy

Review of Stockton-on-Tees Borough Council's (SoTBC's) Core Strategy Development Plan Document[5] did not identify any planning policies of relevance to the assessment.

[5] Core Strategy Development Plan Document, SoTBC, 2010.

3.0 Baseline

3.1 Introduction

Existing air quality conditions in the vicinity of the proposed development Site were identified in order to provide a baseline for consideration. These are detailed in the following sections.

3.2 Local Air Quality Management

As required by the Environment Act (1995), SoTBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that concentrations of all pollutant considered within the AQS are currently below the relevant AQOs. As such, no AQMAs have been designated within the borough.

3.3 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by SoTBC throughout their area of jurisdiction. Recent results recorded in the vicinity of the development are shown in Table 3.

Monitoring Site		Monitored NO_2 Concentration ($\mu g/m^3$)		
		2014	2015	2016
A1035	Nelson Terrace	-	19.0	19.6

Table 3: Monitoring Results

As shown in Table 3, annual mean NO_2 concentrations were below the AQO at the A1035 - Nelson Terrace automatic analyser in recent years. It should be noted that monitoring commenced at the Nelson Terrace site during 2015, as such concentrations prior to this date were not available. Reference should be made to Figure 2 for a map of the survey position.

SoTBC do not undertake PM_{10} monitoring within the vicinity of the Site.

3.4 Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The Site is located in grid square NGR: 443500, 519500. Data for this location was downloaded from the DEFRA website[6] for the purpose of the project. This data is summarised in Table 4 below.

Pollutant	Predicted Background Pollutant Concentration ($\mu g/m^3$)		
	2016	2018	2028
NO_2	13.21	12.34	8.79
PM_{10}	10.19	10.04	9.78

Table 4: Predicted Background Pollutant Concentrations

As shown in Table 4, predicted background NO_2 and PM_{10} concentrations are below the relevant AQOs at the development Site.

[6] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015.

4.0 Methodology

4.1 Introduction

The proposed development has the potential to cause the following impacts:

- Exposure of existing receptors to fugitive dust emissions as a result of construction phase activities;
- Increase pollution levels at sensitive receptors as a result of exhaust emissions associated with vehicle trips produced by future residents travelling to and from the Site; and,
- Exposure of future occupants to poor air quality should elevated pollution levels be experienced at the Site.

These issues were assessed in accordance with the following methodology.

4.2 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V1.1'[7] .

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

- Earthworks;
- Construction; and,
- Trackout.

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

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

The assessment steps are detailed below.

Step 1

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

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

Step 2

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

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and,

[7] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

- The sensitivity of the are to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

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

Step 2A defined the potential magnitude of dust emissions through the construction phase. The relevant criteria are summarised in Table 5.

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

Table 5: Construction Dust - Magnitude of Emission

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 6.

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

Table 6: Construction Dust - Examples of Factors Defining Sensitivity of an Area

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

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

These factors were considered in the undertaking of this assessment.

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 7.

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

Table 7: Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property

Table 8 outlines the criteria for determining the sensitivity of the area to human health impacts.

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

		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

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

Table 9 outlines the criteria for determining the sensitivity of the area to ecological impacts.

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

Table 9: Construction Dust - Sensitivity of the Area to Ecological Impacts

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

Table 10 outlines the risk category from earthworks and construction activities.

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

Table 10: Construction Dust - Dust Risk Category from Earthworks and Construction Activities

Table 11 outlines the risk category from trackout activities.

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

Table 11: Construction Dust - Dust Risk Category from Trackout Activities

Step 3

Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[8] to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should

[8] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

be to control effects through the use of effective mitigation. Experience shows this is normally possible. Hence the residual effect will normally be **not significant**.

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. The IAQM guidance suggests the provision of details of the assessor's qualifications and experience. These can be provided upon request.

4.3 Operational Phase Assessment

The development has the potential to affect existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the Site, as well as expose future occupants to poor air quality. Potential impacts have been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2016 - Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2028 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2028 should the proposals be completed).

The dispersion modelling inputs are outlined in the following sections.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.1.1.0). ADMS-Roads was developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

Assessment Area

Ambient concentrations were predicted over the area NGR: 442795, 518330 to 444445, 519980. One Cartesian grid was used over the stated extents within the model to produce data suitable for contour plotting using the Surfer software package. Specific sensitive receptor points were also identified within the vicinity of roads affected by changes in traffic flows as a result of the development. These are summarised in section 5.3.

Reference should be made to Figure 3 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Baseline traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as Heavy Duty Vehicle (HDV) proportion, was provided by Systra, the Transport Consultants for the project.

Baseline traffic data for the A1305, A135, A139, A177 and A1130 not available from the Transport Consultants and was therefore obtained from the Department for Transport (DfT)[9]. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 1999 to 2016. It should be noted that the DfT web tool is referenced in DEFRA guidance[10] as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the Site.

Road widths were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the assessment is provided in Table 12.

[9] http://www.dft.gov.uk/traffic-counts/.
[10] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Mean Vehicle Speed (km/h)	Road Width (m)
		2016	2028 DM	2028 DS			
L1	Nelson Terrace south of Hutchinson Terrace junction	16,698	19,077	19,202	2.35	45	14.9
L2	Nelson Terrace northbound (NB) at Hutchinson Terrace junction	8,349	9,538	9,601	2.35	30	9.8
L3	Nelson Terrace southbound (SB) at Hutchinson Terrace junction	8,349	9,538	9,601	2.35	30	6.3
L4	Victoria Street	16,698	19,077	19,202	2.35	45	16.1
L5	Victoria Street NB at Bishopton Lane junction	8,349	9,538	9,601	2.35	25	12.5
L6	Victoria Street SB at Bishopton Lane junction	8,349	9,538	9,601	2.35	40	6.3
L7	Victoria Street NB between Bishopton Lane junction and approach to Station Street Roundabout	8,349	9,538	9,629	2.35	45	6.9
L8	Victoria Street NB approach to Station Street Roundabout	8,349	9,538	9,629	2.35	25	8.3
L9	Victoria Street SB between Bishopton Lane junction and approach to Station Street Roundabout	8,349	9,538	9,629	2.35	45	8.5
L10	Victoria Street SB exit from Station Street Roundabout	8,349	9,538	9,629	2.35	25	8.1
L11	Victoria Street SB approach to Bishopton Lane	8,349	9,538	9,629	2.35	25	8.5
L12	A177 slow phase (SP)	15,468	17,672	17,701	1.90	25	11.4
L13	A177	15,468	17,672	17,701	1.90	45	11.4
L14	Norton Road SP	16,910	19,319	19,349	4.83	25	9.7
L15	Norton Road	16,910	19,319	19,349	4.83	45	9.7
L16	Maritime Road SP	20,606	23,542	23,571	1.89	25	6.9
L17	Maritime Road	20,606	23,542	23,571	1.89	45	6.9
L18	A1305	16,732	19,116	19,116	3.16	45	6.6
L19	A1305 SP	16,732	19,116	19,116	3.16	25	5.6
L20	A1130 Bridge Road	18,579	21,226	21,791	3.68	40	10.7
L21	A135 SP	16,786	19,177	19,742	3.92	25	25.1
L22	A135	16,786	19,177	19,742	3.92	65	21.8
L23	A1130 between Parkfield Road and A135	15,341	17,527	18,656	5.33	35	33.2

L24	A1130, East of Prince Street Roundabout	17,565	20,067	21,197	5.27	40	20.1
L25	Nelson Terrace at Dovecot Street Junction	16,698	19,077	19,202	2.35	25	14.1
L26	Nelson Terrace, South of Dovecot Street	16,698	19,077	19,202	2.35	45	10.3
L27	Nelson Terrace to A1130/Yarm Lane Roundabout	16,698	19,077	19,202	2.35	25	11.4
L28	Yarm Lane to A1130/Yarm Lane Roundabout	11,791	13,470	14,725	1.43	25	21.5
L29	Yarm Lane, East of Sheraton Street, SP	11,791	13,470	14,725	1.43	40	11.6
L30	Yarm Lane, East of Sheraton Street, 30mph	11,791	13,470	14,725	1.43	45	8.5
L31	Yarm Lane, East of Sheraton Street, 20mph	11,791	13,470	14,725	1.43	35	8.5
L32	Oxbridge Lane, West of Sheraton Street, 20mph	8,845	10,105	10,276	1.60	35	8.8
L33	Oxbridge Lane, West of Sheraton Street, 30mph	8,845	10,105	10,276	1.60	45	6.7
L34	Oxbridge Lane, West of Sheraton Street SP	8,845	10,105	10,276	1.60	25	7.8
L35	A1027 Hartburn Avenue SP	11,906	13,602	13,870	0.60	25	13.7
L36	A1027 Hartburn Avenue	11,906	13,602	13,870	0.60	45	7.5
L37	Oxbridge Lane	8,845	10,105	10,105	1.60	40	8.9
L38	Bishopton Road West	5,021	5,737	5,737	1.94	40	7.8
L39	A1207 Oxbridge Avenue, South of Grangefield Road, SP	11,906	13,602	13,699	0.60	25	17.3
L40	A1207 Oxbridge Avenue, South of Grangefield Road	11,906	13,602	13,699	0.60	45	8.1
L41	A1207 Oxbridge Avenue, North of Grangefield Road	13,166	15,041	15,570	0.61	45	9.3
L42	A1207 Oxbridge Avenue, North of Grangefield Road, SP	13,166	15,041	15,570	0.61	25	13.2
L43	A1207 Bishopton Avenue, North of Oxbridge Avenue, SP	13,166	15,041	15,570	0.61	25	14.6
L44	A1207 Bishopton Avenue, North of Oxbridge Avenue	13,166	15,041	15,570	0.61	45	8.7
L45	Bishopton Road, West of Grays Lane, SP	5,021	5,737	5,737	1.94	25	8.2
L46	Bishopton Road, West of Grays Lane	5,021	5,737	5,737	1.94	45	8.2
L47	Grays Lane	2,200	2,514	2,568	0.40	35	6.5
L48	Bishopton Road, East of Grays Lane	5,004	5,717	5,771	1.95	45	8.1

L49	Bishopton Lane, SP	5,004	5,717	5,771	1.95	25	9.1
L50	Grangefield Road, between Grays Road and Oxbridge Avenue, SP	1,828	2,088	2,712	2.43	25	8.3
L51	Grangefield Road, between Grays Road and Oxbridge Avenue	1,828	2,088	2,712	2.43	40	7.3
L52	Grangefield Road, between Grays Road and Primary Site Access	3,620	4,135	4,813	0.74	40	7.2
L53	Grangefield Road, between Primary Site Access and Secondary Site Access	4,046	4,622	6,048	0.66	40	7.2
L54	Grangefield Road, between Secondary Site Access and Yarm Lane	4,312	4,926	6,352	0.62	40	7.2
L55	Grangefield Road, between Secondary Site Access and Yarm Lane, SP	4,312	4,926	6,352	0.62	25	7.2
R1	Station Street Roundabout	13,936	15,922	16,102	3.28	25	10.5
R2	A1130/Yarm Lane Roundabout	13,715	15,669	16,925	3.07	25	10.2
R3	A1207 Roundabout	10,376	11,854	12,024	1.03	25	10.1

Table 12: Traffic Data

Reference should be made to Figure 3 for a graphical representation of the road link locations.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (EFT) (version 8.0.1). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

There is current uncertainty over NO_2 concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2016 emission factors were utilised in preference to the Site opening year in order to provide robust concentration predictions. As predictions for 2016 were verified, it is considered results are an indication of worst case concentrations during the operation of the proposal.

Meteorological Data

Meteorological data used in the assessment was taken from Durham Tees Valley Airport meteorological station over the period 1st January 2016 to 31st December 2016 (inclusive). Durham Tees Valley Airport is located at NGR: 437702, 513183, which is approximately 8.3km south-west of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 4 for a wind rose of the utilised meteorological data.

Roughness Length

The roughness length (z_0) is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 0.5m was used to describe the modelling extents. This value of z_0 is considered appropriate

for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'parkland, open suburbia'.

A z_0 of 0.1m was used to describe the meteorological site. This value of z_0 is considered appropriate for the morphology of the area due to the large expanse of flat land use, including runways, grassland and open water, and is suggested within ADMS-Roads as being suitable for 'root crops'.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

A minimum Monin-Obukhov length of 1m was used to describe conditions at the meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'rural areas'.

Background Concentrations

Annual mean NO_2 and PM_{10} background concentrations for use in this assessment were taken from the DEFRA mapping study for the grid square containing the Site. These are shown in Table 4.

Similarly, to emission factors, the background concentration from 2016 was utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 6.1) provided by DEFRA, which is the method detailed within DEFRA guidance[11].

Verification

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

For the purpose of the assessment model verification was undertaken for 2016 using traffic data, meteorological data and monitoring results from this year.

SoTBC undertook monitoring of NO_2 concentrations at one location within the modelling extents during 2016. A result was obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance[12]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration is summarised in Table 13.

[11] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.
[12] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Monitoring Site		Monitored NO_2 Concentration ($\mu g/m^3$)	Calculated Road NO_x Concentration ($\mu g/m^3$)
A1035	A1035 Nelson Terrace	19.6	12.2

Table 13: Verification - Monitoring Result

The annual mean road NO_x concentration predicted from the dispersion model and the road NO_x concentration calculated from the 2016 NO_2 monitoring result is summarised in Table 14.

Monitoring Site		Calculated Road NO_x Concentration ($\mu g/m^3$)	Modelled Road NO_x Concentration ($\mu g/m^3$)
A1035	A1035 Nelson Terrace	12.2	6.57

Table 14: Verification - Modelling Result

The monitored and modelled NO_x road contribution concentrations were compared to calculate the associated ratio. This indicated a verification factor of 1.8561 was required to be applied to all modelling results.

Monitoring of PM_{10} concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust PM_{10} model prediction in lieu of more accurate data in accordance with DEFRA guidance[13].

Road Vehicle Exhaust Emission Impacts

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the Site. Locations sensitive to potential changes in pollutant concentrations were identified within 200m of the highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)[14] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[15] on where the AQOs apply, as summarised in Table 2, was utilised to determine appropriate receptor positions.

The significance of predicted air quality impacts was determined in accordance with the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[16]. Using this methodology impacts were defined based on the interaction between the predicted pollutant concentration from the DS scenario and the magnitude of change between the DM and DS scenarios, as outlined in Table 15.

Concentration at Receptor in Assessment Year	Predicted Concentration Change as Proportion of AQO (%)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

Table 15: Road Vehicle Exhaust Emissions - Significance of Impact

The matrix shown in Table 15 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

[13] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.
[14] DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.
[15] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.
[16] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Following the prediction of impacts at discrete receptor locations, the IAQM document[17] provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and,
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

The IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

Future Exposure

The proposed development has the potential to expose future residents to poor air quality. Pollutant concentrations were therefore quantified across the Site using dispersion modelling as detailed previously. The results were subsequently compared with the relevant AQOs to determine the potential for any exceedance.

[17] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

5.0 Assessment

5.1 Introduction

There is the potential for air quality impacts as a result of the construction and operation of the proposed scheme. These are assessed in the following sections.

5.2 Construction Phase Assessment

Step 1

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

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

The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350m of the Site boundary. These are summarised in Table 16.

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	10 - 100	0
Up to 50	More than 100	0
Up to 100	More than 100	-
Up to 350	More than 100	-

Table 16: Earthworks and Construction Dust Sensitive Receptors

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the Site access. These are summarised in Table 17.

Distance from Site Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	More than 100	0
Up to 50	More than 100	0

Table 17: Trackout Dust Sensitive Receptors

There are no ecological receptors within 50m of the Site or trackout boundary. As such, ecological impacts have not been assessed further within this report.

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 18.

Guidance	Comment
Whether there is any history of dust generating activities in the area	The desk top study did not indicate any dust generating activities in the local area
The likelihood of concurrent dust generating activities on nearby sites	A review of the planning portal indicated an application for the erection of 117 dwellings has

	been approved approximately 150m to the south-west of the development (reference: (13/0299/FUL). It is therefore possible that there will be concurrent dust generation should the construction phases of the two schemes overlap
Pre-existing screening between the source and the receptors	There is no significant screening around the Site boundary
Conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place	As shown in Figure 4, the predominant wind bearing at the Site is from the south. As such, receptors to the north of the boundary are most likely to be affected by dust releases
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	The construction phase is expected to last approximately 10 years. However, due to the nature of surrounding land uses, receptors are considered unlikely to become significantly more sensitive during this time period
Any known specific receptor sensitivities which go beyond the classification given in the document	No specific receptor sensitivities identified during the baseline assessment

Table 18: Additional Area Sensitivity Factors

Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties. As such, users would expect to enjoy a reasonable level of amenity, aesthetics or the value of their property could be diminished by soiling and people would be expected to be present for extended periods of time.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.2, is shown in Table 19.

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

Table 19: Sensitivity of the Surrounding Area

The potential risk of dust impacts at the identified receptors is considered in the following sections.

Step 2

<u>Earthworks</u>

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The Site covers an area greater than 10,000m^2. In accordance with the criteria outlined in Table 5, the magnitude of potential dust emission from earthworks is therefore **large**.

Table 19 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **high** risk site for dust soiling as a result of earthworks.

Table 19 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 10, the development is considered to be a **low** risk site for human health impacts as a result of earthworks.

Construction

Due to the nature of the development, the total building volume is likely to be between greater than 100,000m^3. In accordance with the criteria outlined in Table 5, the magnitude of potential dust emissions from construction is therefore **large**.

Table 19 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **high** risk site for dust soiling as a result of construction activities.

Table 19 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 10, the development is considered to be a **low** risk site for human health impacts as a result of construction activities.

Trackout

Based on the Site area, it is anticipated that the unpaved road length may be greater than 100m. In accordance with the criteria outlined in Table 5, the magnitude of potential dust emissions from trackout is therefore **large**.

Table 19 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 11, the development is considered to be a **high** risk site for dust soiling as a result of trackout activities.

Table 19 indicates the sensitivity of the area to human health impacts is **medium**. In accordance with the criteria outlined in Table 11, the development is considered to be a **medium** risk site for human health impacts as a result of trackout activities.

Summary of the Risk of Dust Effects

A summary of the risk from each dust generating activity is provided in Table 20.

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	High	High	High
Human Health	Low	Low	Medium

Table 20: Summary of Potential Unmitigated Dust Risks

As indicated in Table 20, the potential risk of dust soiling is **high** from earthworks, construction and trackout. The potential risk of human health effects is **medium** from trackout and **low** from earthworks and construction.

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

Step 3

The IAQM guidance[18] provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development Site as summarised in Table 21. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the LA.

[18] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Issue	Control Measure
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on-site Display the name and contact details of person(s) accountable for air quality and dust issues on the Site boundary. This may be the environment manager/engineer or the Site manager Display the head or regional office contact information Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken Make the complaints log available to the LA upon request Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book
Monitoring	Undertake daily on-site and off-site inspection to monitor dust, record inspection results, and make the log available to the LA upon request Carry out regular Site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the LA upon request Increase the frequency of Site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions
Site preparation	Plan Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible Fully enclose specific operations where there is a high potential for dust production and they are active for an extensive period Avoid Site runoff of water or mud Keep Site fencing, barriers and scaffolding clean using wet methods Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used 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 Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques Ensure an adequate water supply on the Site for effective dust suppression, using non-potable water where possible and appropriate Use enclosed chutes and conveyors and covered skips Minimise drop heights and use fine water sprays wherever appropriate Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods
Waste management	Avoid bonfires and burning of waste materials

Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil as soon as practicable Only remove the cover in small areas during work and not all at once
Construction	Avoid scabbling (roughening of concrete surfaces) if possible Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out
Trackout	Use water-assisted dust sweeper on access and local roads Avoid dry sweeping of large areas Ensure vehicles entering and leaving Site are covered to prevent escape of materials Implement a wheel washing system Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the Site exit

Table 21: Fugitive Dust Emissions Mitigation Measures

Step 4

Assuming the relevant mitigation measures outlined in Table 21 are implemented, the residual impacts from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[19].

5.3 Operational Phase Assessment

Vehicle movements associated with the operation of the proposal will generate exhaust emissions on the local and regional road networks. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the Site, as well as consider potential exposure of future occupants to AQO exceedances.

The assessment considered the following scenarios:

- 2016 - Verification;
- 2028 - DM; and,
- 2028 - DS.

The DM scenario (i.e. without development) included anticipated baseline traffic data, inclusive of anticipated growth for the relevant assessment year. The DS scenario (i.e. with development) included anticipated baseline traffic data, inclusive of anticipated growth for the relevant assessment year, in addition to predicted vehicle trips associated with the operation of the proposals.

For the purpose of the assessment traffic data for 2028 was utilised as the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors and background concentrations for 2016 were utilised within the dispersion model. The use of 2028 traffic data and 2016 emission factors and background concentrations is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Road Vehicle Exhaust Emission Impacts

Receptors

[19] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 22. Receptor heights were selected to take account for less sensitive land uses, such as ground floor retail units.

Receptor		NGR (m)		Height (m)
		X	Y	
R1	Residential - Yarm Lane	444298.7	518663.7	4.0
R2	Residential - Yarm Lane	443938.5	518624.0	1.5
R3	Residential - Sheraton Street	443695.6	518676.7	4.0
R4	Oxbridge Lane Primary School	443677.0	518652.5	1.5
R5	Residential - Hartburn Avenue	442941.6	518667.4	1.5
R6	Residential - Sheraton Street	443682.2	518830.3	1.5
R7	Residential - Sheraton Street	443687.1	518925.8	1.5
R8	Residential - Sheraton Street	443633.4	518979.7	1.5
R9	Residential - Grangefield Road	442882.3	519279.1	1.5
R10	Residential - Grangefield Road	443177.7	519224.3	1.5
R11	Residential - Bishopton Avenue	442906.0	519741.7	1.5
R12	Residential - Bishopton Lane	444257.0	519425.3	1.5
R13	Residential - Grays Lane	443349.3	519251.4	1.5
R14	Residential - Nelson Terrace	444349.6	519140.5	1.5

Table 22: Road Vehicle Exhaust Emission Sensitive Receptors

Reference should be made to Figure 5 for a graphical representation of the road vehicle exhaust emission sensitive receptor locations.

Predicted Concentrations

Annual mean NO_2 concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 23.

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Yarm Lane	19.36	19.82	0.46
R2	Residential - Yarm Lane	21.13	21.81	0.68
R3	Residential - Sheraton Street	18.50	19.04	0.54
R4	Oxbridge Lane Primary School	20.04	20.58	0.54
R5	Residential - Hartburn Avenue	19.64	19.72	0.08
R6	Residential - Sheraton Street	16.37	17.02	0.65
R7	Residential - Sheraton Street	16.23	16.89	0.66
R8	Residential - Sheraton Street	15.62	16.15	0.53
R9	Residential - Grangefield Road	20.84	21.23	0.39
R10	Residential - Grangefield Road	14.81	15.06	0.25

R11	Residential - Bishopton Avenue	22.13	22.37	0.24
R12	Residential - Bishopton Lane	16.52	16.56	0.04
R13	Residential - Grays Lane	16.46	16.80	0.34
R14	Residential - Nelson Terrace	20.01	20.08	0.07

Table 23: Predicted Annual Mean NO_2 Concentrations

As indicated in Table 23, predicted annual mean NO_2 concentrations were below the relevant AQO at all sensitive receptors in both scenarios. Reference should be made to Figures 6 and 7 for graphical representations of annual mean NO_2 concentrations across the assessment area for the DM and DS scenarios, respectively.

Annual mean PM_{10} concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 24.

Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Yarm Lane	11.10	11.17	0.07
R2	Residential - Yarm Lane	11.49	11.61	0.12
R3	Residential - Sheraton Street	11.01	11.10	0.09
R4	Oxbridge Lane Primary School	11.26	11.34	0.09
R5	Residential - Hartburn Avenue	11.16	11.17	0.01
R6	Residential - Sheraton Street	10.70	10.81	0.11
R7	Residential - Sheraton Street	10.68	10.79	0.11
R8	Residential - Sheraton Street	10.58	10.67	0.09
R9	Residential - Grangefield Road	11.49	11.55	0.06
R10	Residential - Grangefield Road	10.44	10.48	0.04
R11	Residential - Bishopton Avenue	11.54	11.57	0.04
R12	Residential - Bishopton Lane	10.71	10.72	0.01
R13	Residential - Grays Lane	10.72	10.77	0.06
R14	Residential - Nelson Terrace	11.27	11.28	0.01

Table 24: Predicted Annual Mean PM_{10} Concentrations

As indicated in Table 24, predicted annual mean PM_{10} concentrations were below the relevant AQO at all sensitive receptors in both scenarios. Reference should be made to Figures 8 and 9 for graphical representations of annual mean PM_{10} concentrations across the assessment area for the DM and DS scenarios, respectively.

Predicted Impacts

Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 25.

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Yarm Lane	Below 75% of AQO	1	Negligible
R2	Residential - Yarm Lane	Below 75% of AQO	2 - 5	Negligible
R3	Residential - Sheraton Street	Below 75% of AQO	1	Negligible
R4	Oxbridge Lane Primary School	Below 75% of AQO	1	Negligible
R5	Residential - Hartburn Avenue	Below 75% of AQO	0	Negligible
R6	Residential - Sheraton Street	Below 75% of AQO	2 - 5	Negligible
R7	Residential - Sheraton Street	Below 75% of AQO	2 - 5	Negligible
R8	Residential - Sheraton Street	Below 75% of AQO	1	Negligible
R9	Residential - Grangefield Road	Below 75% of AQO	1	Negligible
R10	Residential - Grangefield Road	Below 75% of AQO	1	Negligible
R11	Residential - Bishopton Avenue	Below 75% of AQO	1	Negligible
R12	Residential - Bishopton Lane	Below 75% of AQO	0	Negligible
R13	Residential - Grays Lane	Below 75% of AQO	1	Negligible
R14	Residential - Nelson Terrace	Below 75% of AQO	0	Negligible

Table 25: Predicted Impacts - NO_2

As indicated in Table 25, impacts on annual mean NO_2 concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Predicted impacts on annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 26.

Receptor		Predicted Annual Mean PM_{10} Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Yarm Lane	Below 75% of AQO	0	Negligible
R2	Residential - Yarm Lane	Below 75% of AQO	0	Negligible
R3	Residential - Sheraton Street	Below 75% of AQO	0	Negligible
R4	Oxbridge Lane Primary School	Below 75% of AQO	0	Negligible
R5	Residential - Hartburn Avenue	Below 75% of AQO	0	Negligible
R6	Residential - Sheraton Street	Below 75% of AQO	0	Negligible
R7	Residential - Sheraton Street	Below 75% of AQO	0	Negligible
R8	Residential - Sheraton Street	Below 75% of AQO	0	Negligible
R9	Residential - Grangefield Road	Below 75% of AQO	0	Negligible
R10	Residential - Grangefield Road	Below 75% of AQO	0	Negligible

R11	Residential - Bishopton Avenue	Below 75% of AQO	0	Negligible
R12	Residential - Bishopton Lane	Below 75% of AQO	0	Negligible
R13	Residential - Grays Lane	Below 75% of AQO	0	Negligible
R14	Residential - Nelson Terrace	Below 75% of AQO	0	Negligible

Table 26: Predicted Impacts - PM_{10}

As indicated in Table 26, impacts on annual mean PM_{10} concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Future Exposure

The proposed development has the potential to cause exposure of future residents to elevated air pollutant levels. Dispersion modelling was therefore undertaken with the inputs described in Section 4.3 to quantify air quality conditions at the Site. This included consideration of vehicle exhaust emissions on the local road network, as well as other background sources. Reference should be made to Figures 7 and 9 for graphical representations of the results for NO_2 and PM_{10} concentrations, respectively.

It should be noted that all presented results have been verified in accordance with the methodology outlined within Section 4.3.

As shown in Figure 7, annual mean NO_2 concentrations were predicted to be below the AQO of 40µg/m^3 at all locations across the Site. The maximum level at the boundary was 20.85µg/m^3. As such, future residents are not predicted to be exposed to NO_2 concentrations above the AQO.

As shown in Figure 9, annual mean PM_{10} concentrations were predicted to be below the AQO of 40µg/m^3 at all locations across the Site. The maximum level at the boundary was 11.42µg/m^3. As such, future residents are not predicted to be exposed to PM_{10} concentrations above the AQO.

Based on the assessment results, the Site is considered suitable for residential development.

Overall Impact Significance

The overall significance of operational phase impacts was determined as **negligible**. This was based on the overall predicted impacts at discrete receptor locations, predicted concentrations at the Site and the considerations outlined previously. Further justification is provided in Table 27.

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO_2 and PM_{10} concentrations were below the relevant AQOs at all sensitive receptor locations. It is considered unlikely that future air quality conditions will change significantly in the absence of the development given the relatively established nature of the area
The extent of current and future population exposure to the impacts	The development is not predicted to affect the population exposed to exceedances of the AQOs
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	The assessment assumed that vehicle exhaust emission rates and background pollutant levels will not reduce in future years. This provides worst-case results when compared with DEFRA and Highways Agency methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

Table 27: Operational Phase Overall Impact Significance

The IAQM guidance[20] states that only if the impact is greater than **slight**, the effect is considered **significant**. As impacts were predicted to be **negligible**, overall effects are considered **not significant**, in accordance with the stated methodology.

[20] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

6.0 Summary and Conclusions

Delta-Simons, working with our approved technical specialist Redmore Environmental, has been appointed to prepare this Air Quality Assessment in support of the planning application for a residential development at the former Millfield Works, Grangefield Road, Stockton on Tees.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the Site during operation, as well as expose future residents to any existing air quality issues. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.

During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the Site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by earthworks, construction and trackout activities was predicted to be **not significant**.

The proposed development has the potential to expose future users to elevated pollution levels and impact existing air quality in the vicinity of the Site during operation. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict pollutant concentrations as a result of emissions from the local highway network. Results were subsequently verified using local monitoring data.

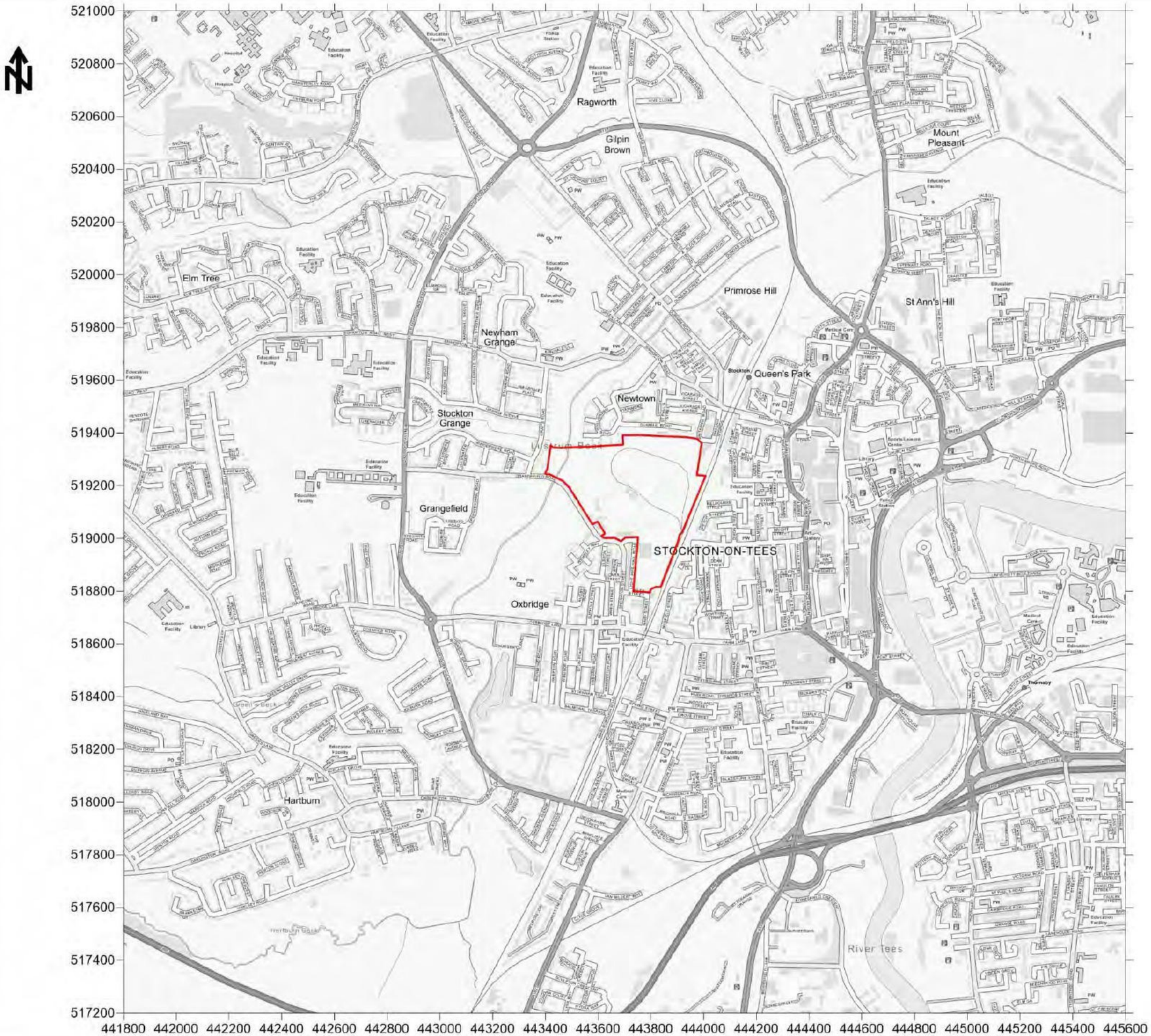
Impacts on NO_2 and PM_{10} concentrations as a result of operational phase road vehicle exhaust emissions were predicted to be **negligible** at all sensitive receptor locations.

The dispersion modelling results indicated than annual mean NO_2 and PM_{10} concentrations were predicted to be below the relevant AQOs at all locations across the Site. The location is therefore considered suitable for residential use.

Following consideration of the relevant issues, air quality impacts as a result of the operation of the proposals were considered to be **not significant**, in accordance with the IAQM guidance.

Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposal.

Figures



Legend

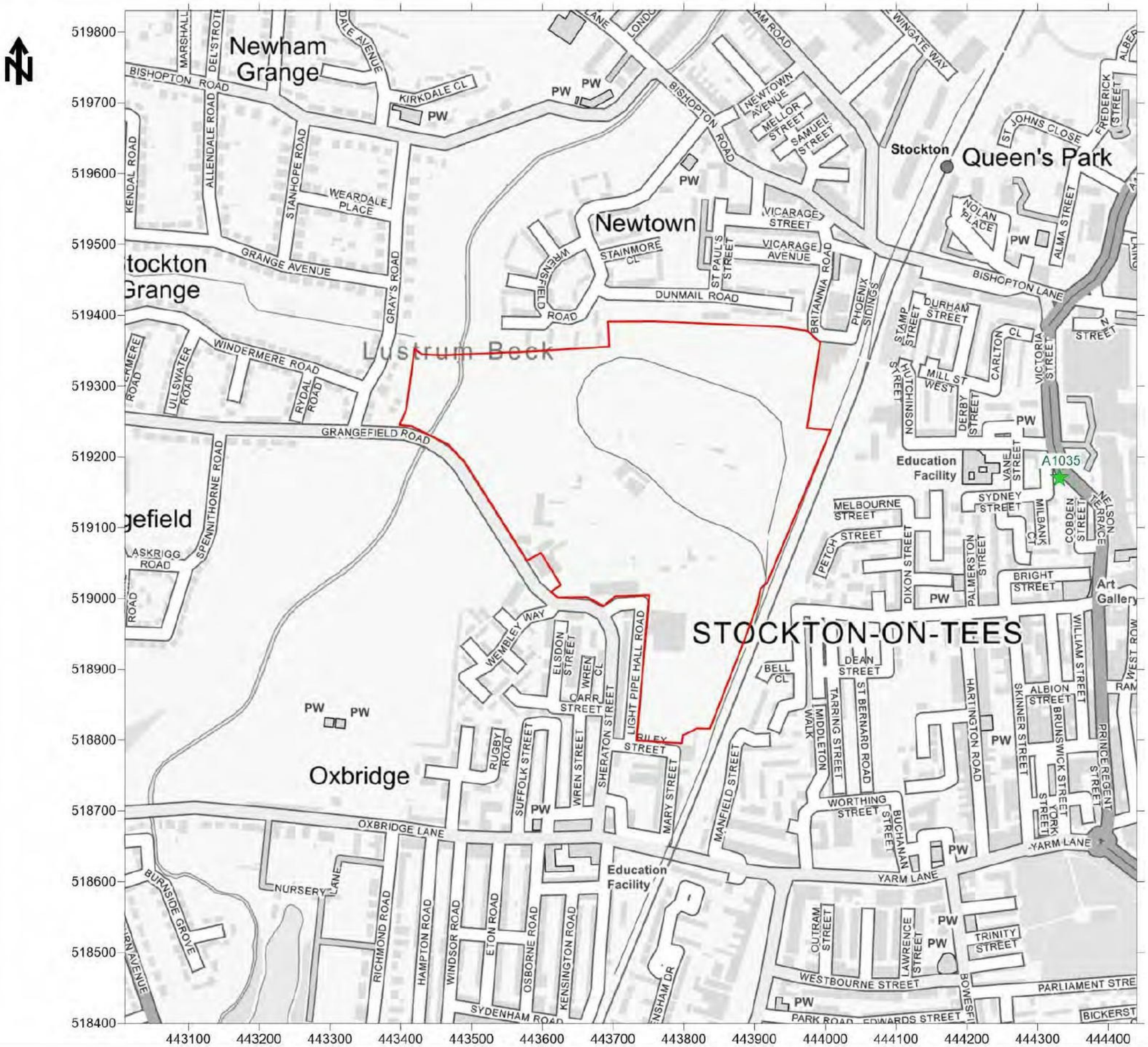
Site Boundary

Title

Figure 1 - Site Location Plan

Project

Air Quality Assessment
Millfield Works, Grangefield Road



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Site Location Plan

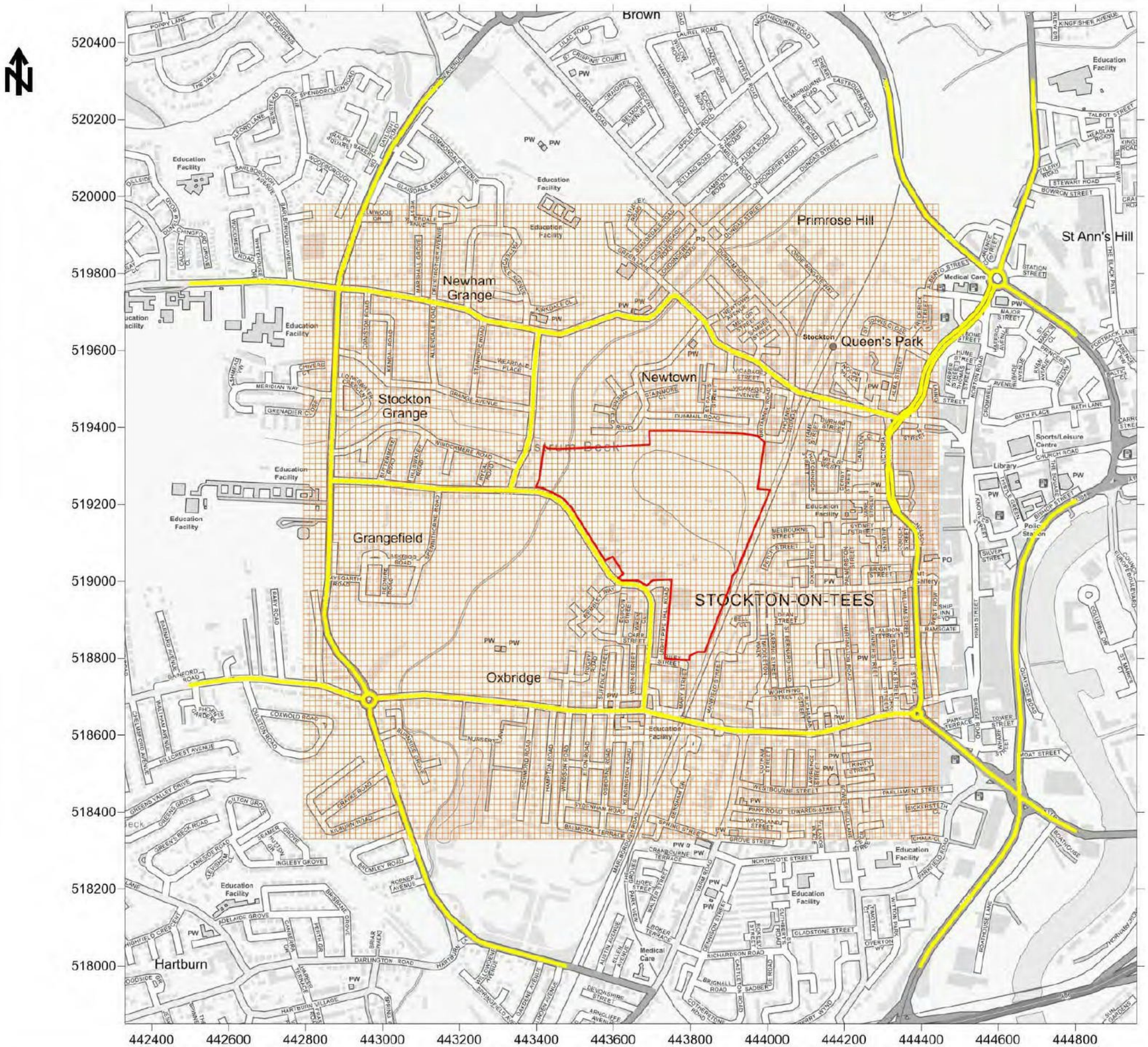
Monitor

Title

Figure 2 - Monitoring Locations

Project

Air Quality Assessment
Millfield Works, Grangefield Road



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Site Boundary

Road Input

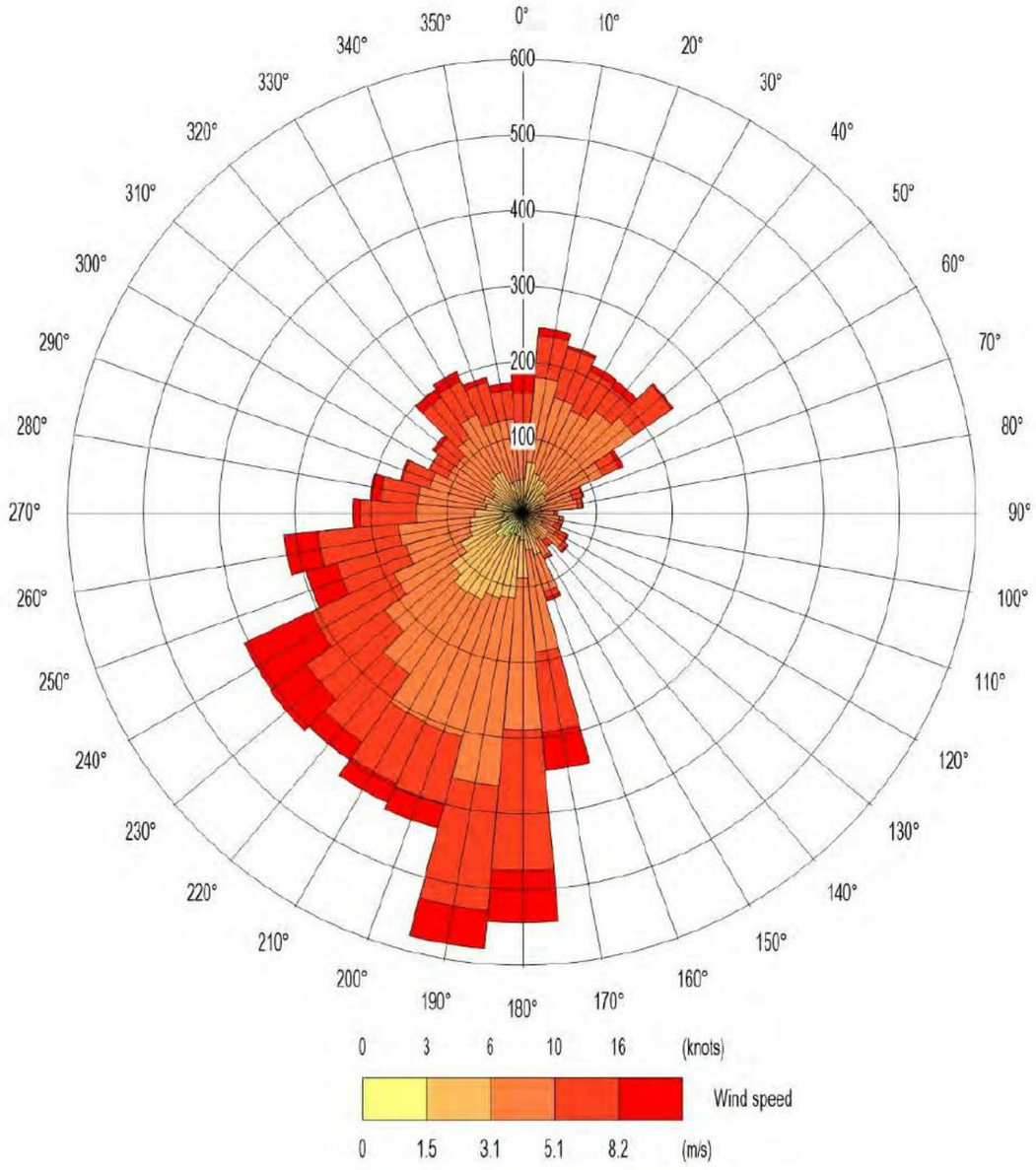
Output Grid

Title

Figure 3 - ADMS-Roads Inputs

Project

Air Quality Assessment
Millfield Works, Grangefield Road



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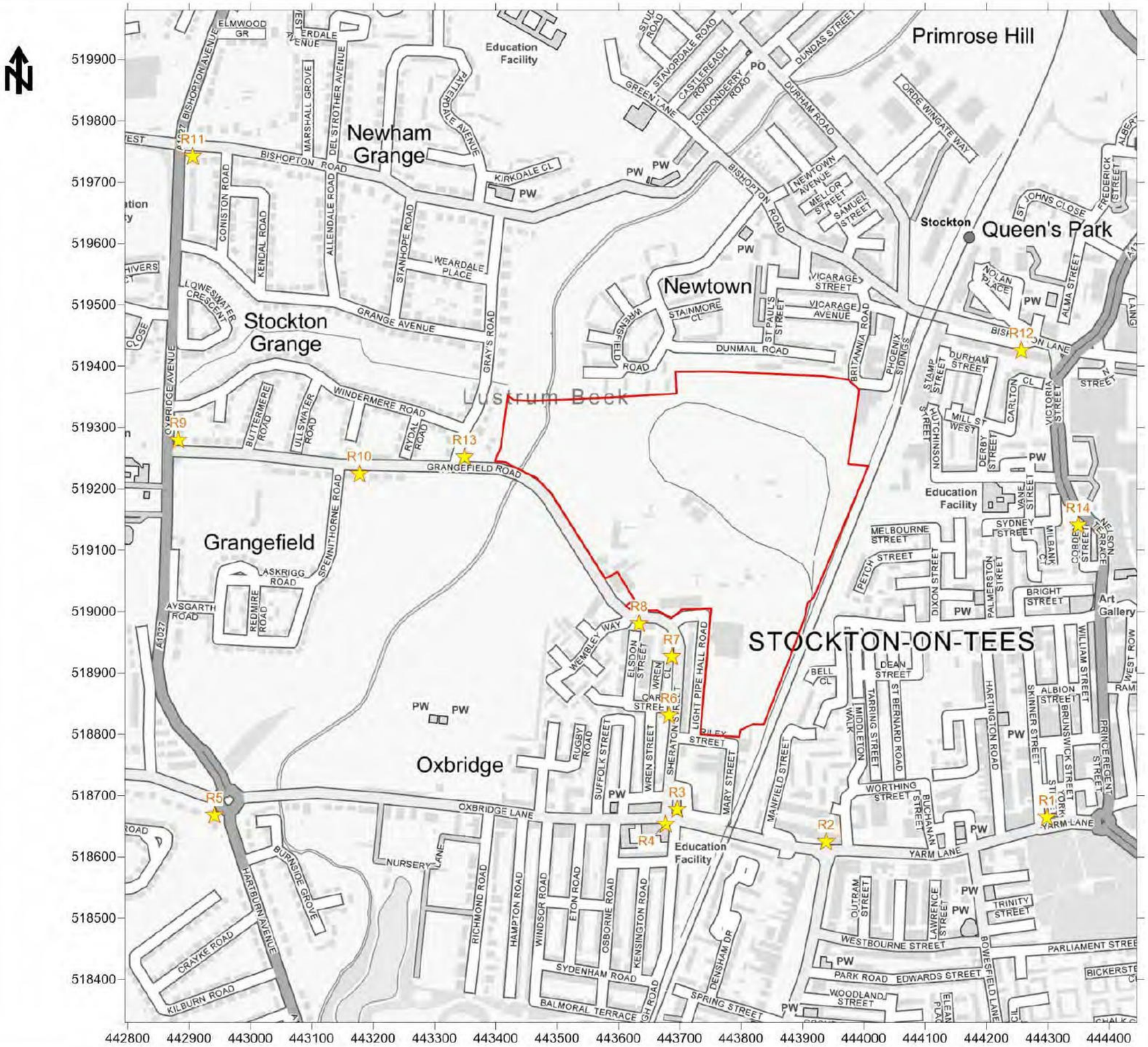
Title

Figure 4 - Wind Rose of 2016
Durham Tees Valley Airport
Meteorological Data

Project

Air Quality Assessment
Millfield Works, Grangefield Road



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Site Boundary

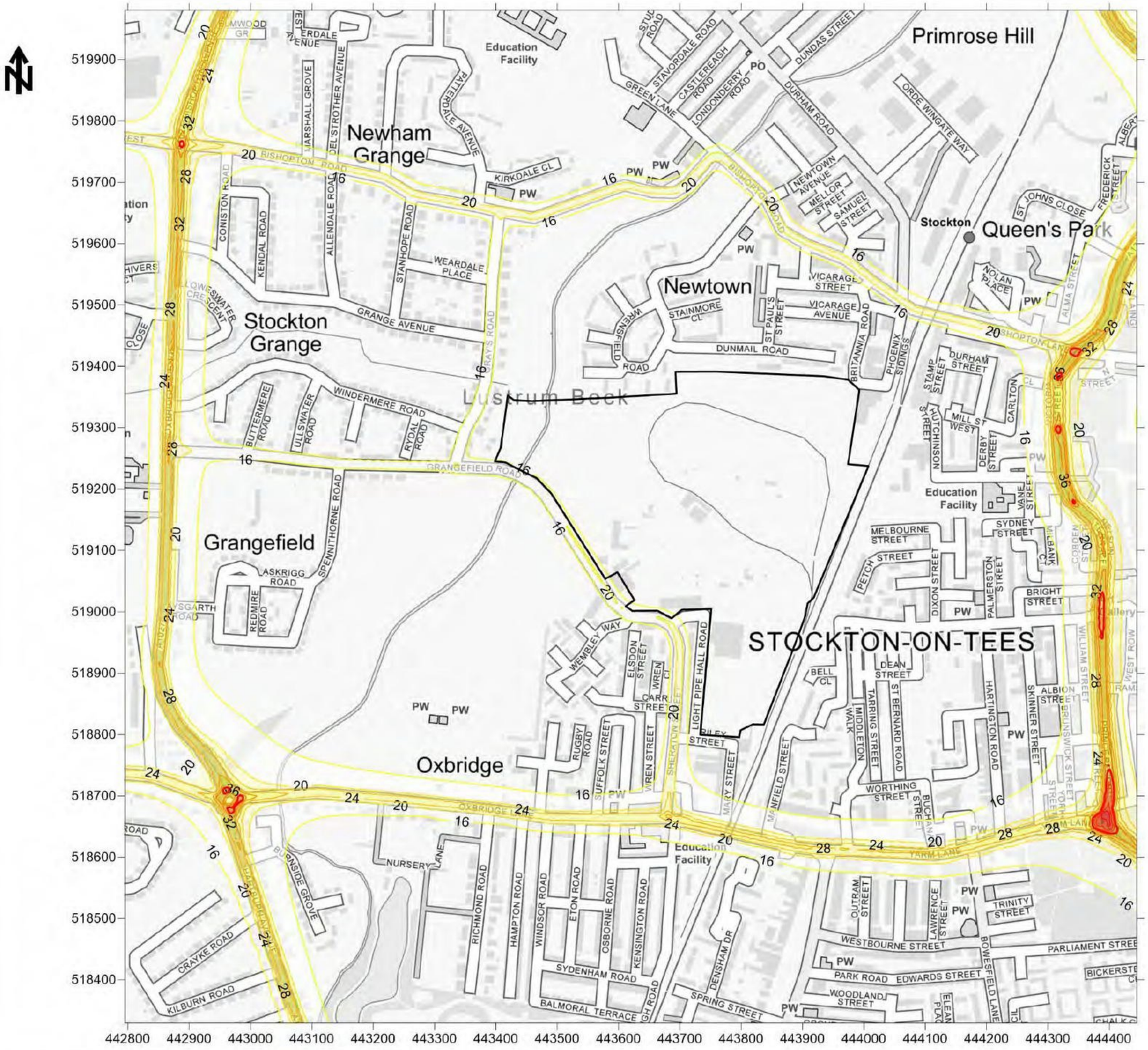
Sensitive Receptor

Title

Figure 5 - Road Vehicle Exhaust Emission Sensitive Receptors

Project

Air Quality Assessment
Millfield Works, Grangefield Road



Legend

Site Boundary

Annual Mean NO_2 Concentrations ($\mu g/m^3$)

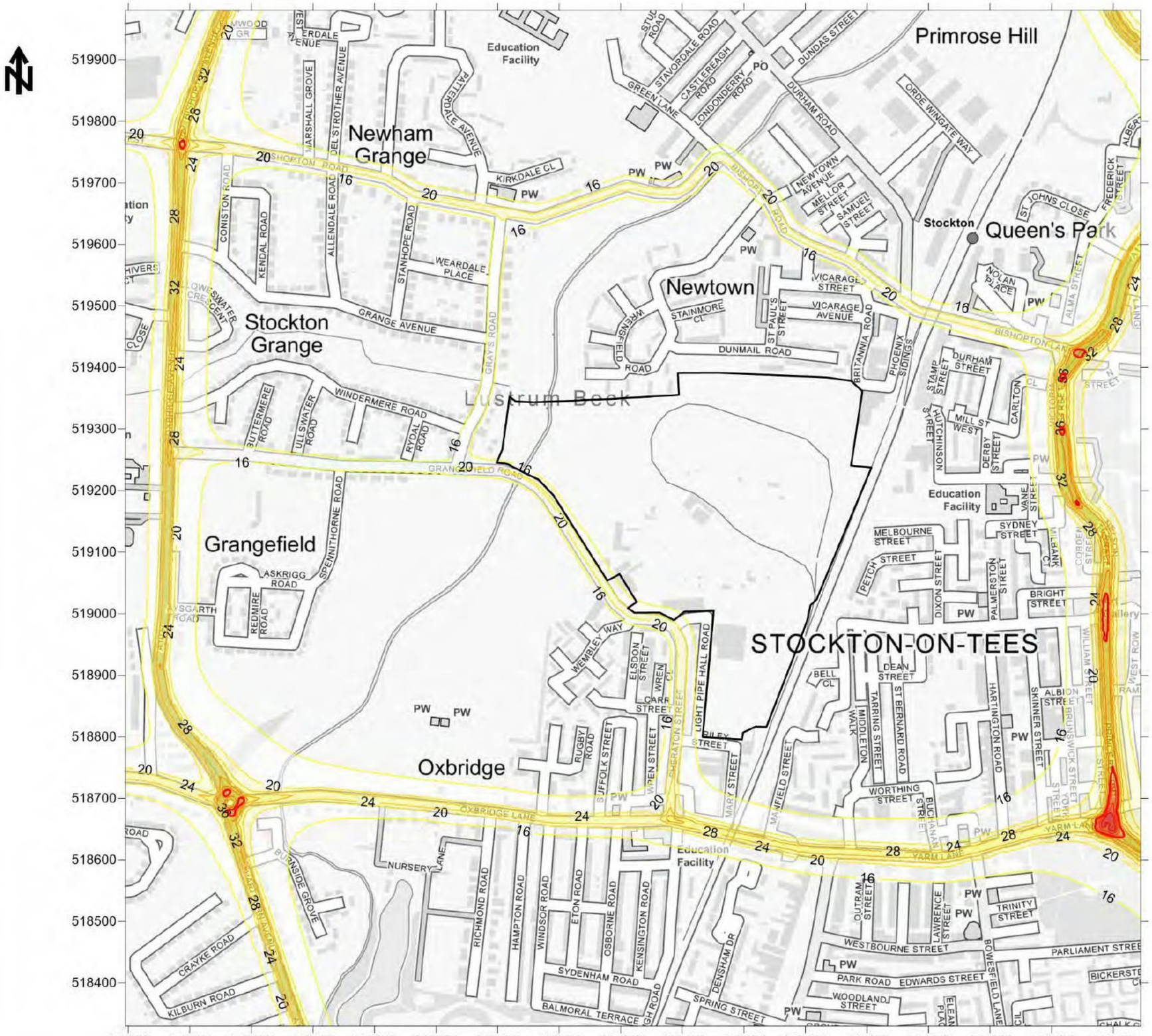
52
48
44
40
36
32
28
24
20
16

Title

Figure 6 - Predicted Annual Mean NO_2 Concentrations ($\mu g/m^3$) Do-Minimum

Project

Air Quality Assessment
Millfield Works, Grangefield Road



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Site Boundary

Annual Mean NO_2 Concentrations ($\mu g/m^3$)

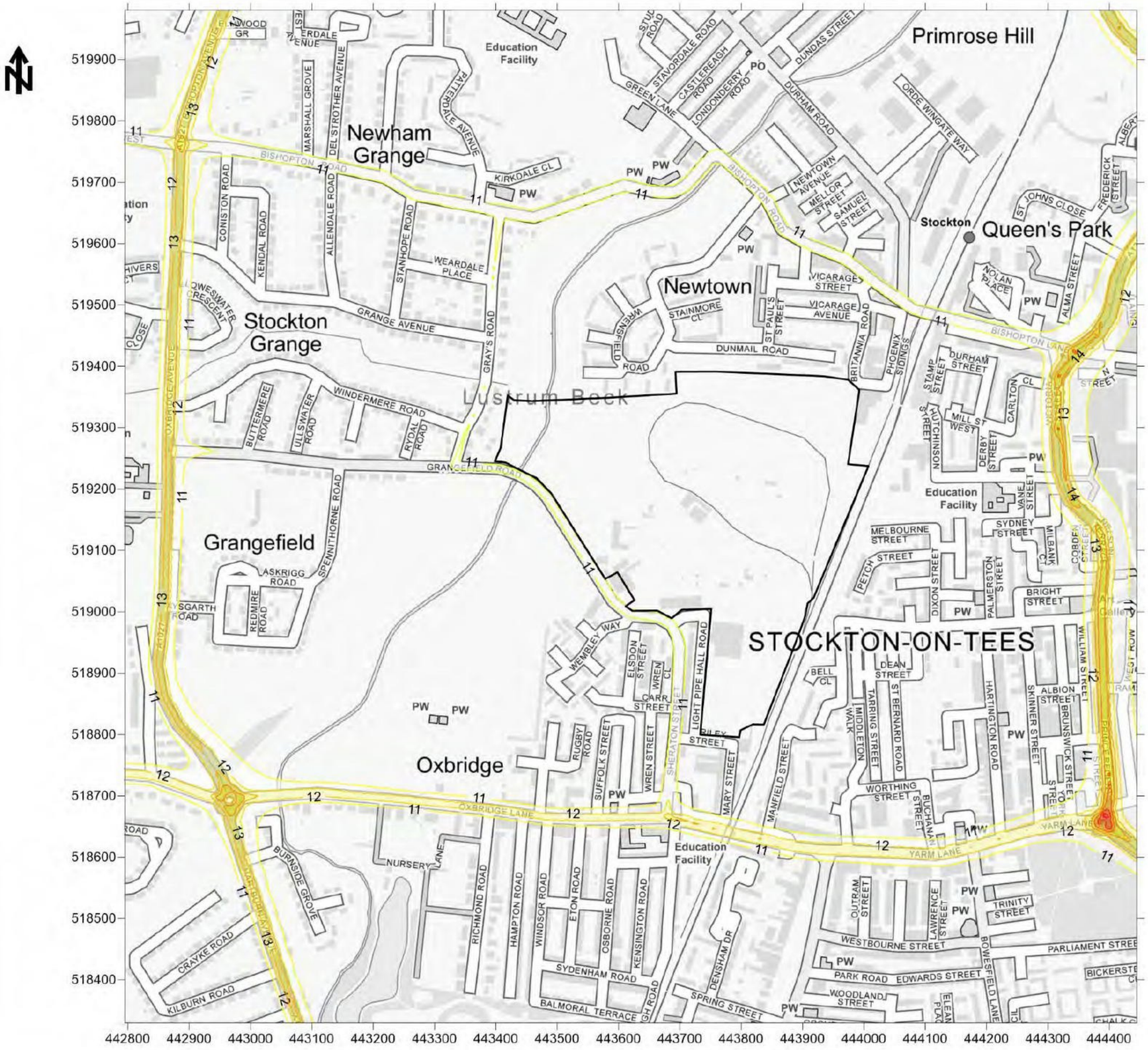
52
48
44
40
36
32
28
24
20
16

Title

Figure 7 - Predicted Annual Mean NO_2 Concentrations ($\mu g/m^3$) Do-Something

Project

Air Quality Assessment
Millfield Works, Grangefield Road



Legend

Site Boundary

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

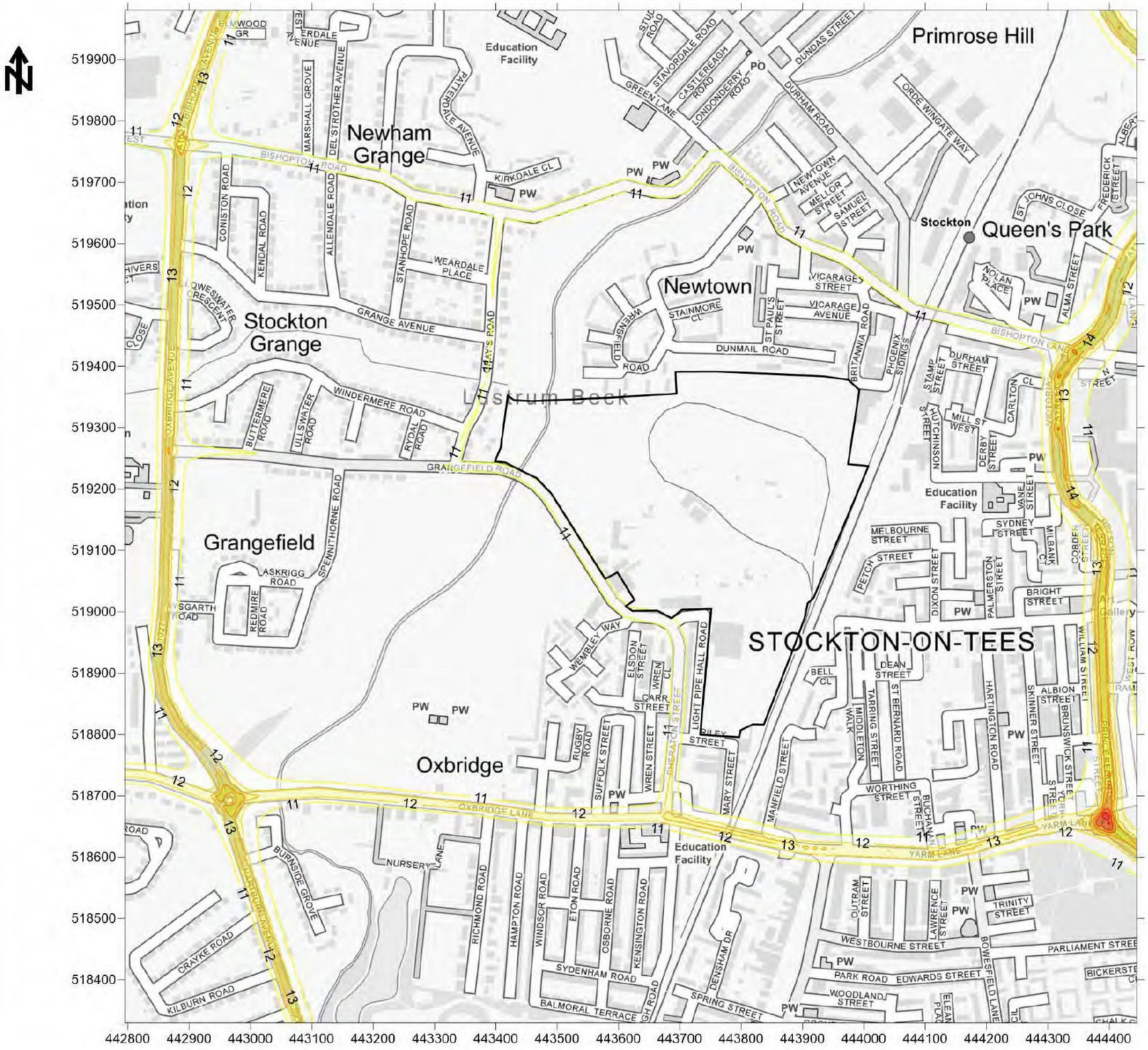
17
16
15
14
13
12
11

Title

Figure 8 - Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$) Do-Minimum

Project

Air Quality Assessment
Millfield Works, Grangefield Road



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Site Boundary

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

17
16
15
14
13
12
11

Title

Figure 9 - Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$) Do-Something

Project

Air Quality Assessment
Millfield Works, Grangefield Road

Appendix A - Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

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