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AIR QUALITY ASSESSMENT

NENE TRANSPORT (LINCS), SUTTON BRIDGE

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FRANKLIN BROS LIMITED

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CONTENTS

1 INTRODUCTION 1

2 LEGISLATION AND POLICY 2

3 BASELINE 8

4 METHODOLOGY 11

5 RESULTS 19

6 CONCLUSIONS 27

FIGURES

Figure 1 Site Location Plan 28
Figure 2 Monitoring Locations 28
Figure 3 Sensitive Receptor Locations 28
Figure 4 ADMS-6 Inputs 28
Figure 5 Wind Roses of 2018 to 2022 RAF Marham Meteorological Data 28
Figure 6 Predicted Annual mean NO_2 Concentrations 28
Figure 7 Predicted 1-hour mean NO_2 Concentrations 28
Figure 8 Predicted Annual mean PM_{10} Concentrations 28
Figure 9 Predicted 24-hour mean PM_{10} Concentrations 28
Figure 10 Predicted Annual mean $PM_{2.5}$ Concentrations 28

APPENDICES

FIGURES

APPENDIX A - REPORT LIMITATIONS

APPENDIX B - GLOSSARY

1 INTRODUCTION

1.1 Overview

1.1.1 NoiseAir Limited has been commissioned to undertake an Air Quality Assessment (AQA) in support of a planning application for the operation of a mobile asphalt plant.

1.1.2 Atmospheric emissions from the plant have the potential to cause air quality impacts at sensitive locations in the vicinity of the site during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects.

1.1.3 Limitations of this report are outlined in **Appendix A**.

1.2 Site Location and Context

1.2.1 Nene Transport (Lincs) is located on land off the A17, Sutton Bridge, at approximate National Grid Reference (NGR): 547640, 321000. **Figure 1** details the location of the site.

1.2.2 The proposals comprise the erection of a mobile asphalt plant and associated ancillary infrastructure. Process emissions will be released at a height of 15.3m via a dedicated stack.

1.2.3 Atmospheric emissions from the plant have the potential to cause impacts at sensitive locations in the vicinity of the site. An Air Quality Assessment was therefore undertaken to define baseline conditions and quantify potential effects. The results are summarised in the following report.

1.2.4 A glossary of terms used in this report is provided in **Appendix B**.

2 LEGISLATION AND POLICY

2.1 Legislation

2.1.1 The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO_2);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$);
- Benzene; and,
- Carbon monoxide.

2.1.2 Air Quality Target Values were also provided for several additional pollutants. It should be noted that the AQLV for $PM_{2.5}$ stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in April 2023[1]. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 The Environmental Improvement Plan 2023[2] was published in January 2023, providing Interim and Long-term Targets in order to reduce population exposure to $PM_{2.5}$. The concentration target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

2.1.5 **Table 1** presents the AQOs and Interim Target for the pollutants considered within this assessment.

[1] The AQS for England, DEFRA, 2023.
[2] The Environmental Improvement Plan 2023, DEFRA, 2023.

Table 1: Air Quality Objectives/ Interim Target		
Pollutant	**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
$PM_{2.5}$	12[(a)]	Annual mean

Note: (a) Interim Target to be achieved by the end of January 2028.

2.1.6 **Table 2** summarises the advice provided in DEFRA guidance[3] on where the AQOs for pollutants considered within this report apply.

Table 2: Examples of Where the Air Quality Objectives Apply		
Pollutant	**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 objective 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-mean objectives apply Kerbside sites (for example, pavements of busy shopping streets)	Kerbside sites where the public would not be expected to have regular access

[3] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Table 2: Examples of Where the Air Quality Objectives Apply		
	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	

2.2 Local Air Quality Management

2.2.1 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, as summarised in Table 2, 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 (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 National Planning Policy Framework

2.3.1 The revised National Planning Policy Framework (NPPF)[4] was published in September 2023 and sets out the Government's Planning policies for England and how these are expected to be applied.

2.3.2 The purpose of the planning system is to contribute to the achievement of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives included the following of relevance to air quality:

> *"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

2.3.3 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

[4] NPPF, Ministry of Housing, Communities and Local Government, 2023.

> *"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 […]."*

2.3.4 The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clear 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 an Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

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

2.4 National Planning Practice Guidance

2.4.1 National Planning Practice Guidance[5] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?

[5] https://www.gov.uk/guidance/air-quality--3.

5. When could air quality considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

2.4.2 There were reviewed and the relevant guidance considered as necessary throughout the undertaking of the assessment.

2.5 Local Planning Policy

2.5.1 The South East Lincolnshire Local Plan 2011-2036[6], was adopted by the South East Lincolnshire Joint Strategic Planning Committee, a partnership of Boston Borough Council, South Holland District Council (SHDC) and Lincolnshire County Council, on 8th March 2019. Review of the document indicated the following policy of relevance to this report:

> *"Policy 30: Pollution*
>
> *Development proposals will not be permitted where, taking account of any proposed mitigation measures, they would lead to unacceptable adverse impacts upon: […]*
>
> *4. Air quality, including fumes and odour; […]*
>
> *Planning applications, except for development within the curtilage of a dwelling house as specified within Schedule 2, Part 1 of The Town and Country Planning (General Permitted Development)(England) Order 2015, or successor statutory instrument, must include an assessment of: […]*
>
> *9. Impact on the proposed development from poor air quality from identified sources;*
>
> *10. Impact on air quality from the proposed development; and*
>
> *11. Impact on amenity from existing uses.*
>
> *Suitable mitigation measures will be provided, if required. Proposals will be refused if impacts cannot be suitably mitigated or avoided […]."*

[6] South East Lincolnshire Local Plan 2011-2036, South East Lincolnshire Joint Strategic Planning Committee, 2019.

2.5.2 Consideration was made to the above policy throughout the assessment.

3 BASELINE

3.1 Introduction

3.1.1 Existing air quality conditions in the vicinity of the site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

3.2 Local Air Quality Management

3.2.1 As required by the Environment Act (1995), as amended by the Environment Act (2021), SHDC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that concentrations of all pollutants considered within the AQS are currently below the relevant AQOs throughout the Council's administrative extents. As such, no AQMAs have been designated.

3.3 Air Quality Monitoring

3.3.1 Monitoring of pollutant concentrations is undertaken by SHDC throughout their area of jurisdiction. A summary of recent NO_2 monitoring data in the vicinity of the site is presented in **Table 3**.

Table 3: Monitoring Results – NO_2

Monitoring Site		Monitored NO_2 Concentration (µg/m^3)		
		2021	2022	2023
CM2	Westmere School	7.4	7.8	6.8
SH8a, 8b,8c	Westmere (Triplicate)	7.3	7.9	6.8

3.3.2 As shown in **Table 3**, annual mean NO_2 concentrations were below the relevant AQO in recent years.

3.3.3 A summary of recent PM_{10} monitoring data in the vicinity of the site is presented in **Table 4**.

Table 4: Monitoring Results – PM_{10}

Monitoring Site		Monitored PM_{10} Concentration (µg/m^3)		
		2021	2022	2023
CM2	12.6	14.5	12.6	13.4

3.3.4 As shown in **Table 4**, annual mean PM_{10} concentrations were below the relevant AQO in recent years.

3.3.5 Reference should be made to **Figure 2** for a map of the monitoring locations.

3.3.6 Monitoring of $PM_{2.5}$ is not undertaken in the vicinity of the site.

3.4 Background Pollutant Concentrations

3.4.1 Predictions of background pollutant concentrations on a 1km by 1km basis have been produced by DEFRA for the entire of the UK to assist local authorities in their review and assessment of air quality. The site is located in grid square NGR: 547500, 320500. Data for this location was downloaded from the DEFRA website[7] and is summarised in **Table 5**.

Table 5: Predicted Background Pollutant Concentrations

Pollutant	Predicted 2024 Background Pollutant Concentration (µg/m³)
NO_2	6.57
PM_{10}	15.03
$PM_{2.5}$	8.55

3.4.2 As shown in **Table 5**, background concentrations are predicted to be below the relevant AQOs and Interim Target at the site.

3.5 Sensitive Receptors

3.5.1 A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that required specific consideration during the assessment. These are summarised in **Table 6**.

Table 6: Sensitive Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Railway Lane	547318.4	321261.2
R2	Residential - Tycho Close	547506.8	321200.7
R3	Residential - Bridge Lane	547650.6	321196.9
R4	Residential - Church Lane	547769.4	321053.1
R5	Residential - A17	548000.9	320900.3
R6	Residential - Peterpoint Road	547691.0	320508.1
R7	Residential - Peterpoint Road	547479.9	320517.9
R8	Residential - Railway Lane	547218.9	320615.3

[7] Department for Environment, Food and Rural Affairs (Defra) (2023) Background Concentrations [Online] Available at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.

Table 6: Sensitive Receptor Locations			
R9	Residential - Railway Lane	547323.9	320916.4
R10	Residential - Railway Lane	547250.3	321148.1

3.5.2 Reference should be made to **Figure 3** for a map of the sensitive receptor locations.

4 METHODOLOGY

4.1 Introduction

4.1.1 Combustion emissions from the proposed plant have the potential to cause air quality impacts in the vicinity of the site. These have been quantified through dispersion modelling in accordance with the methodology outlined in the following Sections.

4.2 Dispersion Model

4.2.1 Dispersion modelling of emissions was undertaken using ADMS-6 (v6.0.2.0), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-6 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

4.2.2 The model utilises hourly meteorological data to define conditions for plume rise, transport and diffusion. It estimates the concentration for each source and receptor combination for each hour of input meteorology and calculates user-selected long-term and short-term averages.

4.3 Modelling Scenarios

4.3.1 The scenarios considered in the modelling assessment are summarised in **Table 7**.

Table 7: Assessment Scenarios

Parameter	Modelled As	
	Long Term	Short Term
NO_2	Annual mean	99.8th percentile (%ile) 1-hour mean
PM_{10}	Annual mean	90.4th %ile 24-hour mean
$PM_{2.5}$	Annual mean	-

4.3.2 Some short-term air quality criteria are framed in terms of the number of occasions in a calendar year on which the concentration should not be exceeded. As such, the %iles shown in **Table 7** were selected to represent the relationship between the permitted number of exceedences of short-period concentrations and the number of periods within a calendar year.

4.3.3 Predicted pollutant concentrations were summarised in the following formats:

- Process Contribution (PC) - Predicted pollutant concentration as a result of emissions from the proposed plant only; and,
- Predicted Environmental Concentration (PEC) - Total predicted pollutant concentration as a result of emissions from the proposed plant, as well as background levels.

4.3.4 Predicted ground level pollutant concentrations were compared with the relevant AQOs and Interim Target.

4.4 Assessment Area

4.4.1 The assessment area was defined based on the facility location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 546950, 320250 to 548450, 321750. One Cartesian grid with a resolution of 10m was used within the model to produce data suitable for contour plotting using the Surfer software package.

4.4.2 Reference should be made to **Figure 4** for a graphical representation of the assessment grid extents.

4.5 Process Conditions and Emissions

4.5.1 Emissions from the proposed plant were represented by a single point source in the model. The relevant inputs are summarised in **Table 8**. These were provided by the Applicant.

Table 8: Process Conditions

Parameter	Unit	Value
Stack location	NGR (m)	547630.7, 321018.1
Stack height	m	15.3
Stack diameter	m	0.85
Exhaust gas temperature	^{o}C	110
Exhaust gas volumetric flow rate	m^3/hr	7.4
Exhaust gas volumetric flow rate	Nm^3/hr	5.3
Exhaust gas efflux velocity	m/s	12.98
Particulate Matter (PM) emission concentration	mg/Nm^3	20
Oxides of nitrogen (NO_x) emission concentration	mg/Nm^3	50

Table 8: Process Conditions		
Parameter	**Unit**	**Value**
PM emission rate	g/s	0.1050
NO_x emission rate	g/s	0.2625

4.5.2 The PM emission concentration is stated as total dust. However, for the purposes of dispersion modelling it was considered that the entire PM emission consisted of only PM_{10} or $PM_{2.5}$. This allowed the maximum ground level impacts, with respect to the relevant criteria, to be assessed. Actual plant emissions of PM are unlikely to only consist of only one PM fraction, resulting in a worst-case assessment.

4.5.3 The combustion of fuel associated with the asphalt mixing plant will operate between the hours of 7am and 6pm (the asphalt is mixed/made to order and therefore the plant only runs when and if an order is being fulfilled). For the purposes of this exercise, the modelling is based on a constant 12-hours per day, 365-days per year operation.

4.5.4 Reference should be made to **Figure 4** for a map of the emission point location.

4.6 NO_x to NO_2 Conversion

4.6.1 Emissions of total NO_x from combustion processes are predominantly in the form of nitric oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to NO_2. Comparisons of ambient NO and NO_2 concentrations in the vicinity of point sources in recent years has indicated that it is unlikely that more than 30% of the NO_x is present at ground level as NO_2.

4.6.2 Ambient NO_x concentrations were predicted through dispersion modelling. Concentrations of NO_2 shown in the results section assume 70% conversion from NO_x to NO_2 for annual means and 35% conversion for 1-hour concentrations, based upon EA guidance[8].

4.7 Building Effects

4.7.1 The dispersion of substances released from elevated sources can be influenced by the presence of buildings close to the emission points. Structures can interrupt the wind flows and cause significantly higher ground-level concentrations close to the source than would arise in the absence of the buildings.

[8] Environmental permitting: air dispersion modelling reports, Environment Agency (EA), 2018.

4.7.2 Analysis of the site layout indicated that a number of structures should be included within the model in order to take account of effects on pollutant dispersion. Input geometries are shown in **Table 9**.

Table 9: Building Geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
	X	Y				
Main building	547439.1	321050.8	7.0	53.0	151.1	195.0
Plant - north	547637.5	321034.7	12.50	19.4	6.2	193.6
Plant - central	547633.9	321020.3	15.0	10.6	10.0	193.4
Plant - east	547642.8	321024.9	5.1	2.9	8.9	193.7
Plant - silos	547646.6	321012.8	15.3	7.2	15.3	193.7
Plant - south	547646.9	321004.4	4.6	2.3	14.7	193.3

4.7.3 Reference should be made to **Figure 4** for a map of the building locations.

4.8 Meteorological Data

4.8.1 Meteorological data used in the assessment was taken from RAF Marham meteorological station over the period 1st January 2018 to 31st December 2022 (inclusive). RAF Marham meteorological station is located at NGR: 574375, 308790 which is approximately 28.8km south-east of the site. 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.

4.8.2 All meteorological files used in the assessment were provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of data within the UK. Reference should be made to **Figure 5** for wind roses of the utilised meteorological records.

4.9 Roughness Length

4.9.1 The surface roughness (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 is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for ‘parkland, open suburbia’.

4.9.2 A z_0 of 0.2m was used to describe the meteorological site. This is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for 'agricultural areas (min)'.

4.10 Monin-Obukhov Length

4.10.1 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 is considered appropriate for the nature of the area and is suggested within ADMS-6 as being suitable for 'mixed urban/ industrial'.

4.10.2 A minimum Monin-Obukhov length of 1m was used to describe the meteorological site. This is considered appropriate for the nature of the area and is suggested within ADMS-6 as being suitable for 'rural areas'.

4.11 Terrain Data

4.11.1 Ordnance Survey OS Terrain 50 data was included in the model for the site and surrounding area in order to take account of the specific flow field produced by variations in ground height throughout the assessment extents. This was pre-processed using the method suggested by CERC[9].

4.12 Background Concentrations

4.12.1 Review of existing data in the vicinity of the site was undertaken in Section 3.0 in order to identify suitable background values for use in the assessment.

4.12.2 Concentrations of NO_2 and PM_{10} recorded at Westmere School in 2023 were selected to represent baseline levels throughout the modelled extents. These were used in order to ensure a worst-case assessment, as the values are higher than DEFRA predictions.

4.12.3 SHDC do not undertake monitoring of $PM_{2.5}$ concentrations within the vicinity of the site. As such, the value predicted by DEFRA was used to represent baseline levels of this species within the modelled extents.

4.12.4 It is not possible to add short-term peak baseline and process concentrations. This is because the conditions which give rise to peak ground-level concentrations of substances emitted from an elevated source at a particular location and time are likely to be different to the conditions which give rise to peak concentrations due to emissions from other sources. This point is addressed in EA guidance 'Air emissions risk assessment for your environmental permit'[10], which advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum predicted short-term concentration due to emissions from the source to twice the annual mean baseline concentration. This

[9] Note 105: Setting up Terrain Data for Input to CERC Models, CERC, 2016.
[10] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit.

approach was adopted throughout the assessment.

4.13 Assessment Criteria

4.13.1 The significance of predicted air quality impacts at sensitive receptors was determined in accordance with the guidance provided within the Institute of Air Quality Management (IAQM) document 'Land-Use Planning & Development Control: Planning for Air Quality'[11]. Using this methodology impacts on annual mean concentrations are defined based on the interaction between the predicted pollutant concentration with the development in place (PEC) and the magnitude of change (PC), as outlined in **Table 10**.

Table 10: Significance of Impact - Long Term Concentrations

Concentration at Receptor in Assessment Year (PEC)	Predicted Concentration Change as Proportion of Criteria (PC) (%)			
	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

4.13.2 The matrix shown in **Table 10** 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**.

4.13.3 The significance of impacts on short-term pollutant concentrations at sensitive receptors was determined in accordance with the criteria outlined in the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[12], as summarised in **Table 11**.

Table 11: Significance of Impact - Short Term Concentrations

Predicted Concentration Change as Proportion of Criteria (PC) (%)	Significance of Impact
Less than 10	Negligible
11 – 20	Slight

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

Table 11: Significance of Impact - Short Term Concentrations	
Predicted Concentration Change as Proportion of Criteria (PC) (%)	**Significance of Impact**
21 – 50	Moderate
Greater than 51	Substantial

4.13.4 Following the prediction of impacts at discrete receptor locations, the IAQM[13] provide guidance on determining the overall air quality impact significance of the operation of a development and states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

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

4.14 Modelling Uncertainty

4.14.1 Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty - due to model limitations;
- Data uncertainty - due to errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and,
- Variability - randomness of measurements used.

4.14.2 Potential uncertainties in the model results were minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- Choice of model - ADMS-6 is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible;
- Meteorological data - Modelling was undertaken using five annual meteorological data sets from an observation station local to the site. The analysis was based on the worst-

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

case year for each averaging period to ensure maximum concentrations were considered;

- Surface characteristics - The z_0 and Monin-Obukhov length were determined for both the dispersion and meteorological sites based on the surrounding land uses and guidance provided by CERC. Terrain data was included and processed using the method outlined by CERC;
- Plant operating conditions - Operational parameters were provided by the Applicant. As such, these are considered to be representative of normal operating conditions;
- Emission rates - Emission rates were derived from the plant specifications. As such, these are considered to be representative of anticipated releases;
- Background concentrations - Background pollutant levels were obtained DEFRA and local monitoring results. These are considered representative of baseline air quality conditions at sensitive locations within the vicinity of the site;
- Receptor locations - A Cartesian Grid was included in the model in order to provide suitable data for contour plotting. Receptor points were also included at sensitive locations to provide additional consideration of these areas; and,
- Variability - All model inputs were as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

4.14.3 Results were considered in the context of the relevant AQOs, Interim Target and assessment criteria. It is considered that the use of the stated measures to reduce uncertainty and the use of worst-case assumptions when necessary has resulted in model accuracy of an acceptable level.

5 RESULTS

5.1.1 Dispersion modelling was undertaken using the inputs described in Section 4. The results are outlined in the following Section.

5.1.2 Reference should be made to **Figure 6** to **Figure 10** for graphical representations of PECs, inclusive of background levels, throughout the assessment extents. It should be noted that the values shown in the Figures are predictions from the meteorological data set which resulted in the maximum pollutant concentration for that averaging period. For example, the maximum annual mean NO_2 concentration was predicted using the 2020 meteorological data set. As such, the contours shown in **Figure 6** were produced from the 2020 model outputs.

5.2 Nitrogen Dioxide

5.2.1 Predicted annual mean NO_2 PECs at the sensitive receptor locations, inclusive of background levels, are summarised in **Table 12**.

Table 12: Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor		2018	2019	2020	2021	2022
R1	Residential - Railway Lane	6.90	6.90	6.87	6.87	6.91
R2	Residential - Tycho Close	7.05	7.04	7.03	7.00	7.08
R3	Residential - Bridge Lane	7.21	7.23	7.27	7.25	7.28
R4	Residential - Church Lane	7.25	7.24	7.32	7.21	7.21
R5	Residential - A17	6.87	6.89	6.87	6.88	6.89
R6	Residential - Peterpoint Road	6.86	6.84	6.84	6.87	6.84
R7	Residential - Peterpoint Road	6.86	6.83	6.85	6.86	6.85
R8	Residential - Railway Lane	6.84	6.84	6.84	6.85	6.84
R9	Residential - Railway Lane	6.89	6.88	6.88	6.88	6.87
R10	Residential - Railway Lane	6.86	6.87	6.85	6.86	6.87

5.2.2 As indicated in **Table 12**, annual mean NO_2 PECs were below the AQO of 40µg/m^3 at all sensitive receptor locations for all meteorological data sets.

5.2.3 The significance of predicted impacts on annual mean NO_2 concentrations at the receptor locations are summarised in **Table 13**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 13: Predicted Impacts on Annual Mean NO_2 Concentrations

Receptor		Predicted Concentration (PEC)	Predicted Conc. Change as Proportion of AQO (PC) (%)	Impact Significance
R1	Residential - Railway Lane	Below 75% of AQO	1	Negligible
R2	Residential - Tycho Close	Below 75% of AQO	1	Negligible
R3	Residential - Bridge Lane	Below 75% of AQO	2 - 5	Negligible
R4	Residential - Church Lane	Below 75% of AQO	2 - 5	Negligible
R5	Residential - A17	Below 75% of AQO	1	Negligible
R6	Residential - Peterpoint Road	Below 75% of AQO	1	Negligible
R7	Residential - Peterpoint Road	Below 75% of AQO	1	Negligible
R8	Residential - Railway Lane	Below 75% of AQO	1	Negligible
R9	Residential - Railway Lane	Below 75% of AQO	1	Negligible
R10	Residential - Railway Lane	Below 75% of AQO	1	Negligible

5.2.4 As shown in **Table 13**, impacts on annual mean NO_2 concentrations as a result of the operation of the plant were predicted to be **negligible** at all receptors.

5.2.5 The IAQM guidance states that states that only if the impact is greater than **slight**, the effect is considered **significant**. As such, overall impacts on annual mean NO_2 concentrations are considered to be **not significant**, in accordance with the stated guidance.

5.2.6 Predicted 99.8th %ile 1-hour mean NO_2 PECs at the sensitive receptor locations, inclusive of background levels, are summarised in **Table 14**.

Table 14: Predicted 99.8th %ile 1-hour Mean NO_2 Concentrations (µg/m^3)

Receptor		2018	2019	2020	2021	2022
R1	Residential - Railway Lane	15.67	15.58	15.66	15.58	15.68
R2	Residential - Tycho Close	17.37	17.40	17.36	17.43	17.49

Table 14: Predicted 99.8th %ile 1-hour Mean NO_2 Concentrations (µg/m³)						
Receptor		**2018**	**2019**	**2020**	**2021**	**2022**
R3	Residential - Bridge Lane	17.88	17.81	17.88	17.92	17.92
R4	Residential - Church Lane	19.24	19.32	19.36	19.46	19.36
R5	Residential - A17	15.28	15.37	15.34	15.34	15.52
R6	Residential - Peterpoint Road	14.91	15.02	14.97	15.05	15.10
R7	Residential - Peterpoint Road	14.96	14.80	15.03	14.83	14.84
R8	Residential - Railway Lane	14.99	15.20	15.00	14.86	14.99
R9	Residential - Railway Lane	15.91	15.88	15.92	15.79	16.03
R10	Residential - Railway Lane	15.32	15.40	15.32	15.45	15.39

5.2.7 As indicated in **Table 14**, 1-hour mean NO_2 PECs were below the AQO of 200µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.2.8 The significance of predicted impacts on 1-hour mean NO_2 concentrations at the receptor locations are summarised in **Table 15**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 15: Predicted Impacts on 1-hour Mean NO_2 Concentrations			
Receptor		**Predicted Concentration Change as Proportion of the AQO (PC) (%)**	**Impact Significance**
R1	Residential - Railway Lane	Less than 10	Negligible
R2	Residential - Tycho Close	Less than 10	Negligible
R3	Residential - Bridge Lane	Less than 10	Negligible
R4	Residential - Church Lane	Less than 10	Negligible
R5	Residential - A17	Less than 10	Negligible
R6	Residential - Peterpoint Road	Less than 10	Negligible
R7	Residential - Peterpoint Road	Less than 10	Negligible
R8	Residential - Railway Lane	Less than 10	Negligible
R9	Residential - Railway Lane	Less than 10	Negligible
R10	Residential - Railway Lane	Less than 10	Negligible

5.2.9 As indicated in **Table 15**, impacts on 1-hour mean NO_2 concentrations as a result of the operation of the plant were predicted to be **negligible** at all receptors. As such, overall

impacts on 1-hour mean NO_2 concentrations are considered to be **not significant**, in accordance with the stated guidance.

5.3 Particulate Matter

5.3.1 Predicted annual mean PM_{10} PECs at the sensitive receptor locations, inclusive of background levels, are summarised in **Table 16**.

Table 16: Predicted Annual Mean PM_{10} Concentrations (µg/m^3)

Receptor		2018	2019	2020	2021	2022
R1	Residential - Railway Lane	15.08	15.09	15.07	15.07	15.09
R2	Residential - Tycho Close	15.17	15.17	15.16	15.14	15.19
R3	Residential - Bridge Lane	15.27	15.28	15.30	15.28	15.30
R4	Residential - Church Lane	15.29	15.28	15.33	15.26	15.26
R5	Residential - A17	15.07	15.08	15.07	15.07	15.08
R6	Residential - Peterpoint Road	15.06	15.05	15.05	15.07	15.05
R7	Residential - Peterpoint Road	15.07	15.05	15.06	15.06	15.06
R8	Residential - Railway Lane	15.06	15.05	15.05	15.06	15.05
R9	Residential - Railway Lane	15.08	15.08	15.08	15.07	15.07
R10	Residential - Railway Lane	15.07	15.07	15.06	15.06	15.07

5.3.2 As indicated in **Table 16**, annual mean PM_{10} PECs were below the AQO of 40µg/m^3 at all sensitive receptor locations for all meteorological data sets.

5.3.3 The significance of predicted impacts on annual mean PM_{10} concentrations at the receptor locations are summarised in **Table 17**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 17: Predicted Impacts on Annual Mean PM_{10} Concentrations

Receptor		Predicted Concentration (PEC)	Predicted Conc. Change as Proportion of AQO (PC) (%)	Impact Significance
R1	Residential - Railway Lane	Below 75% of AQO	0	Negligible
R2	Residential - Tycho Close	Below 75% of AQO	0	Negligible

Table 17: Predicted Impacts on Annual Mean PM_{10} Concentrations				
Receptor		**Predicted Concentration (PEC)**	**Predicted Conc. Change as Proportion of AQO (PC) (%)**	**Impact Significance**
R3	Residential - Bridge Lane	Below 75% of AQO	1	Negligible
R4	Residential - Church Lane	Below 75% of AQO	1	Negligible
R5	Residential - A17	Below 75% of AQO	0	Negligible
R6	Residential - Peterpoint Road	Below 75% of AQO	0	Negligible
R7	Residential - Peterpoint Road	Below 75% of AQO	0	Negligible
R8	Residential - Railway Lane	Below 75% of AQO	0	Negligible
R9	Residential - Railway Lane	Below 75% of AQO	0	Negligible
R10	Residential - Railway Lane	Below 75% of AQO	0	Negligible

5.3.4 As shown in **Table 17**, impacts on annual mean PM_{10} concentrations as a result of the operation of the plant were predicted to be **negligible** at all receptors. As such, overall impacts on annual mean PM_{10} concentrations are considered to be **not significant**, in accordance with the stated guidance.

5.3.5 Predicted 90.4th %ile 24-hour mean PM_{10} PECs at the sensitive receptor locations, inclusive of background levels, are summarised in **Table 18**.

Table 18: Predicted 90.4th %ile 24-hour Mean PM_{10} Concentrations (µg/m^3)						
Receptor		**2018**	**2019**	**2020**	**2021**	**2022**
R1	Residential - Railway Lane	30.47	30.49	30.38	30.45	30.49
R2	Residential - Tycho Close	31.12	31.11	31.01	30.84	31.24
R3	Residential - Bridge Lane	31.57	31.54	31.80	31.81	31.83
R4	Residential - Church Lane	31.82	31.72	32.07	31.69	31.67
R5	Residential - A17	30.37	30.41	30.35	30.38	30.45
R6	Residential - Peterpoint Road	30.32	30.23	30.20	30.37	30.26
R7	Residential - Peterpoint Road	30.37	30.21	30.32	30.36	30.26
R8	Residential - Railway Lane	30.25	30.21	30.29	30.30	30.28
R9	Residential - Railway Lane	30.41	30.42	30.45	30.34	30.40
R10	Residential - Railway Lane	30.34	30.39	30.31	30.32	30.35

5.3.6 As indicated in **Table 18**, 24-hour mean PM_{10} PECs were below the AQO of 50µg/m^3 at all sensitive receptor locations for all meteorological data sets.

5.3.7 The significance of predicted impacts on 24-hour mean PM_{10} concentrations at the receptor locations are summarised in **Table 19**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 19: Predicted Impacts on 24-hour Mean PM_{10} Concentrations

Receptor		Predicted Concentration Change as Proportion of the AQO (PC) (%)	Impact Significance
R1	Residential - Railway Lane	Less than 10	Negligible
R2	Residential - Tycho Close	Less than 10	Negligible
R3	Residential - Bridge Lane	Less than 10	Negligible
R4	Residential - Church Lane	Less than 10	Negligible
R5	Residential - A17	Less than 10	Negligible
R6	Residential - Peterpoint Road	Less than 10	Negligible
R7	Residential - Peterpoint Road	Less than 10	Negligible
R8	Residential - Railway Lane	Less than 10	Negligible
R9	Residential - Railway Lane	Less than 10	Negligible
R10	Residential - Railway Lane	Less than 10	Negligible

5.3.8 As indicated in **Table 19**, impacts on 24-hour mean PM_{10} concentrations as a result of the operation of the plant were predicted to be **negligible** at all receptors. As such, overall impacts on 24-hour mean PM_{10} concentrations are considered to be **not significant**, in accordance with the stated guidance.

5.3.9 Predicted annual mean $PM_{2.5}$ PECs at the receptor locations, inclusive of background levels, are summarised in **Table 20.**

Table 20: Predicted Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)						
Receptor		**2018**	**2019**	**2020**	**2021**	**2022**
R1	Residential - Railway Lane	8.60	8.61	8.59	8.59	8.61
R2	Residential - Tycho Close	8.69	8.69	8.68	8.66	8.71
R3	Residential - Bridge Lane	8.79	8.80	8.82	8.80	8.82
R4	Residential - Church Lane	8.81	8.80	8.85	8.78	8.78
R5	Residential - A17	8.59	8.60	8.59	8.59	8.60
R6	Residential - Peterpoint Road	8.58	8.57	8.57	8.59	8.57
R7	Residential - Peterpoint Road	8.59	8.57	8.58	8.58	8.58
R8	Residential - Railway Lane	8.58	8.57	8.57	8.58	8.57
R9	Residential - Railway Lane	8.60	8.60	8.60	8.59	8.59
R10	Residential - Railway Lane	8.59	8.59	8.58	8.58	8.59

5.3.10 As indicated in **Table 20**, annual mean $PM_{2.5}$ PECs were below the Interim Target of $12\mu g/m^3$ at all receptor locations for all meteorological data sets.

5.3.11 The significance of predicted impacts on annual mean $PM_{2.5}$ concentrations at the receptor locations are summarised in **Table 21**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 21: Predicted Impacts on Annual Mean $PM_{2.5}$ Concentrations				
Receptor		**Predicted Concentration (PEC)**	**Predicted Conc. Change as Proportion of Interim Target (PC) (%)**	**Impact Significance**
R1	Residential - Railway Lane	Below 75% of Interim Target	1	Negligible
R2	Residential - Tycho Close	Below 75% of Interim Target	1	Negligible
R3	Residential - Bridge Lane	Below 75% of Interim Target	2 - 5	Negligible
R4	Residential - Church Lane	Below 75% of Interim Target	2 - 5	Negligible
R5	Residential - A17	Below 75% of Interim Target	0	Negligible
R6	Residential - Peterpoint Road	Below 75% of Interim Target	0	Negligible
R7	Residential - Peterpoint Road	Below 75% of Interim Target	0	Negligible
R8	Residential - Railway Lane	Below 75% of Interim Target	0	Negligible
R9	Residential - Railway Lane	Below 75% of Interim Target	0	Negligible

Table 21: Predicted Impacts on Annual Mean $PM_{2.5}$ Concentrations				
Receptor		**Predicted Concentration (PEC)**	**Predicted Conc. Change as Proportion of Interim Target (PC) (%)**	**Impact Significance**
R10	Residential - Railway Lane	Below 75% of Interim Target	0	Negligible

5.3.12 As shown in **Table 21**, impacts on annual mean $PM_{2.5}$ concentrations as a result of the operation of the plant were predicted to be **negligible** at all receptors. As such, overall impacts on annual mean PM_{10} concentrations are considered to be **not significant**, in accordance with the stated guidance.

6 CONCLUSIONS

6.1.1 NoiseAir Limited was commissioned to undertake an AQA in support of a planning application for the operation of a mobile asphalt plant.

6.1.2 Atmospheric emissions from the plant at the site have the potential to cause air quality impacts at sensitive locations during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects.

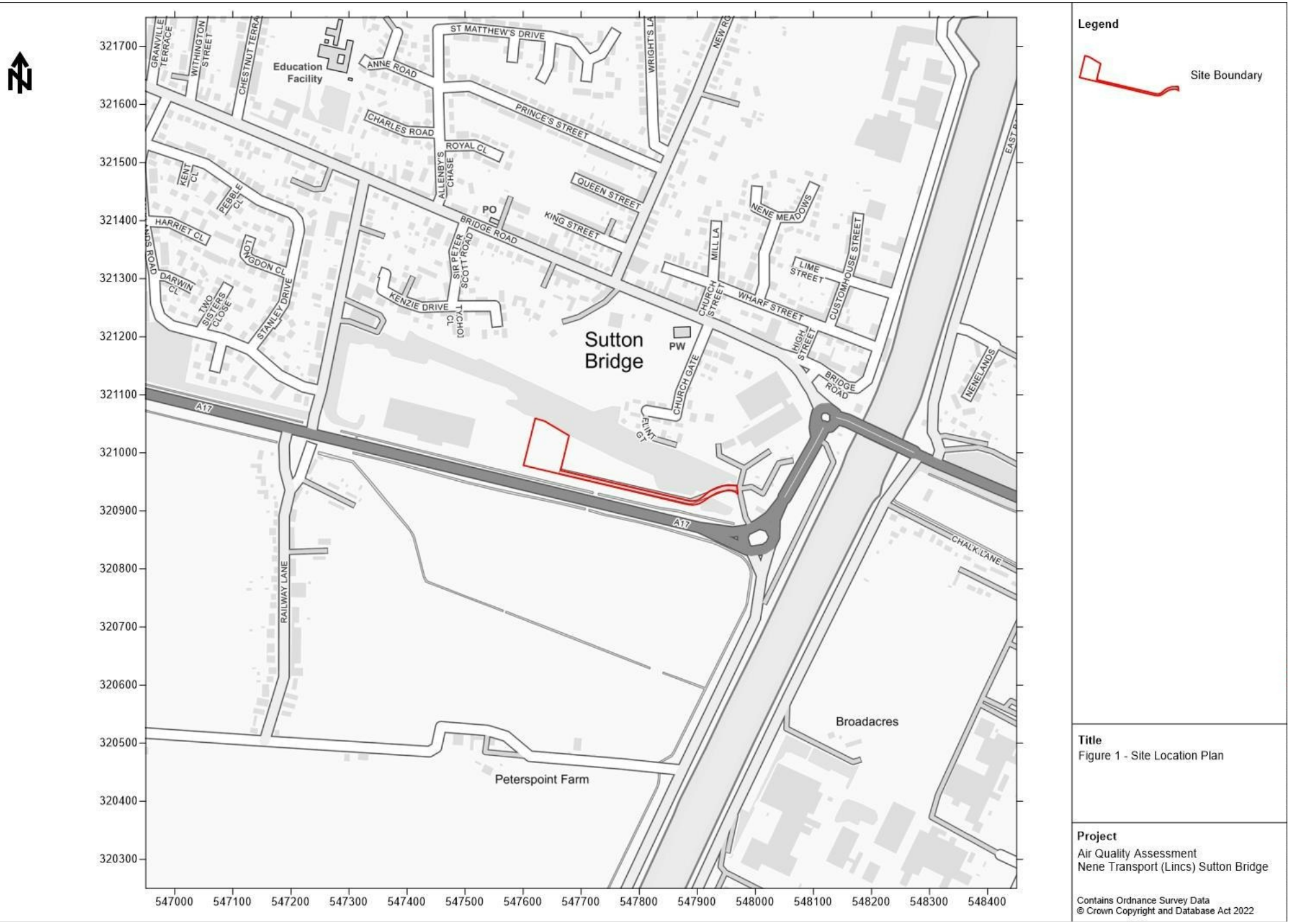
6.1.3 Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the plant. Impacts were quantified and the results compared with the relevant AQOs, Interim Target and significance criteria.

6.1.4 Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ were below the relevant AQOs and Interim Target at all receptor locations for all meteorological data sets modelled. Review of the dispersion modelling results indicated that impacts on NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted to be **negligible** at all receptors. As such, overall impacts are considered to be **not significant** in accordance with the IAQM guidance.

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

FIGURES

Figure 1 Site Location Plan
Figure 2 Monitoring Locations
Figure 3 Sensitive Receptor Locations
Figure 4 ADMS-6 Inputs
Figure 5 Wind Roses of 2018 to 2022 RAF Marham Meteorological Data
Figure 6 Predicted Annual mean NO_2 Concentrations
Figure 7 Predicted 1-hour mean NO_2 Concentrations
Figure 8 Predicted Annual mean PM_{10} Concentrations
Figure 9 Predicted 24-hour mean PM_{10} Concentrations
Figure 10 Predicted Annual mean $PM_{2.5}$ Concentrations



Legend

Site Boundary

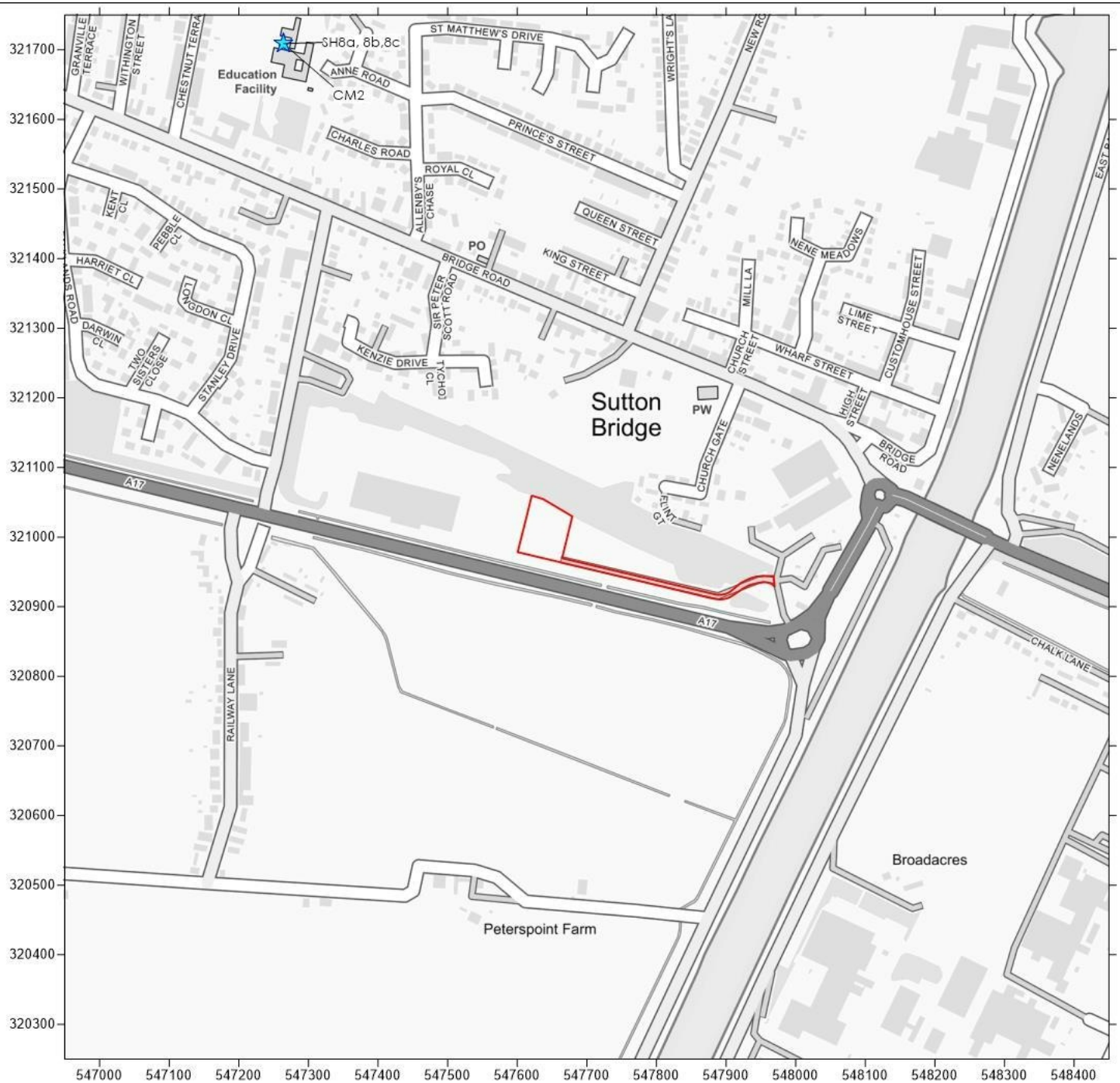
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Figure 1 - Site Location Plan

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Legend

Site Boundary

Monitor

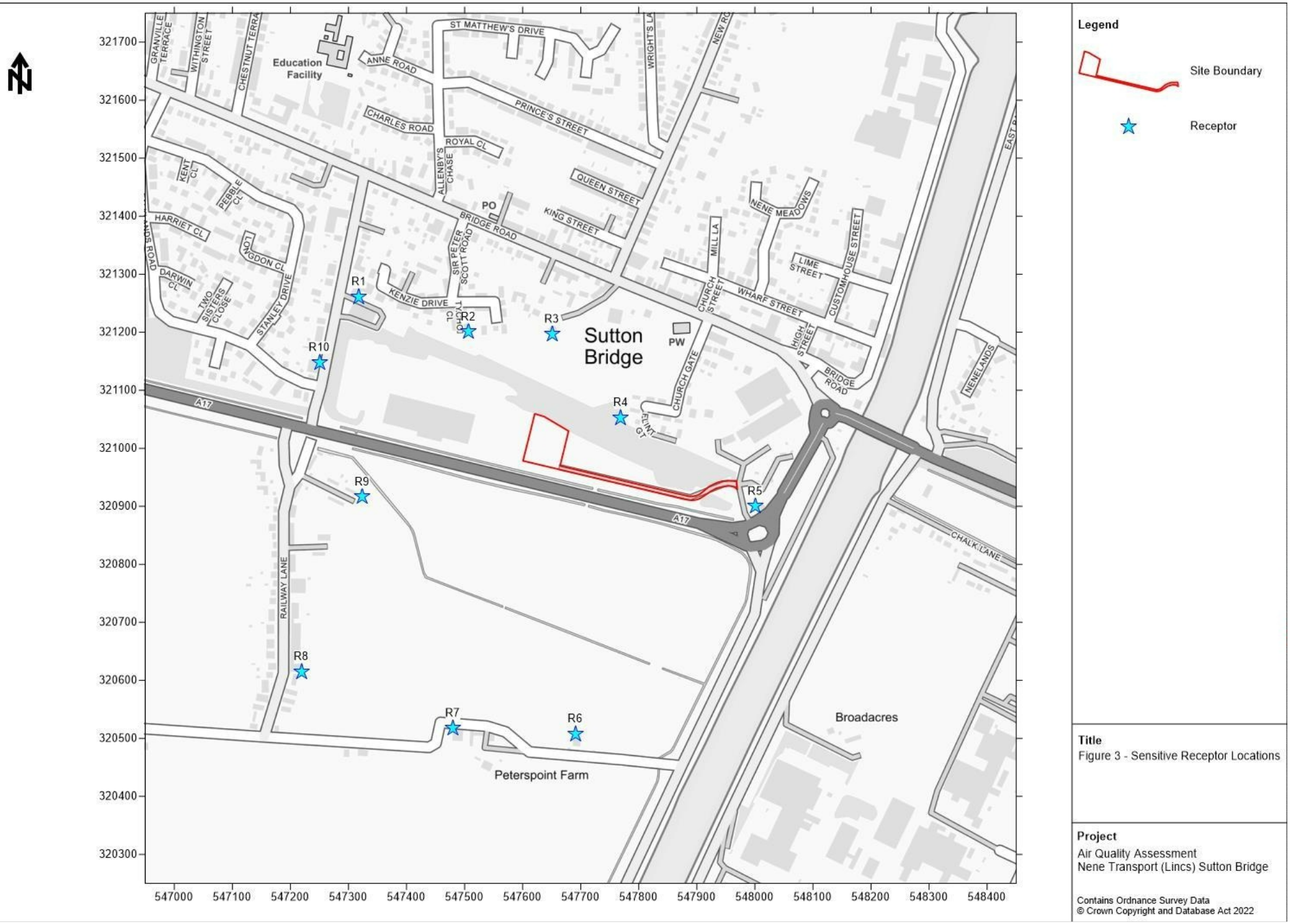
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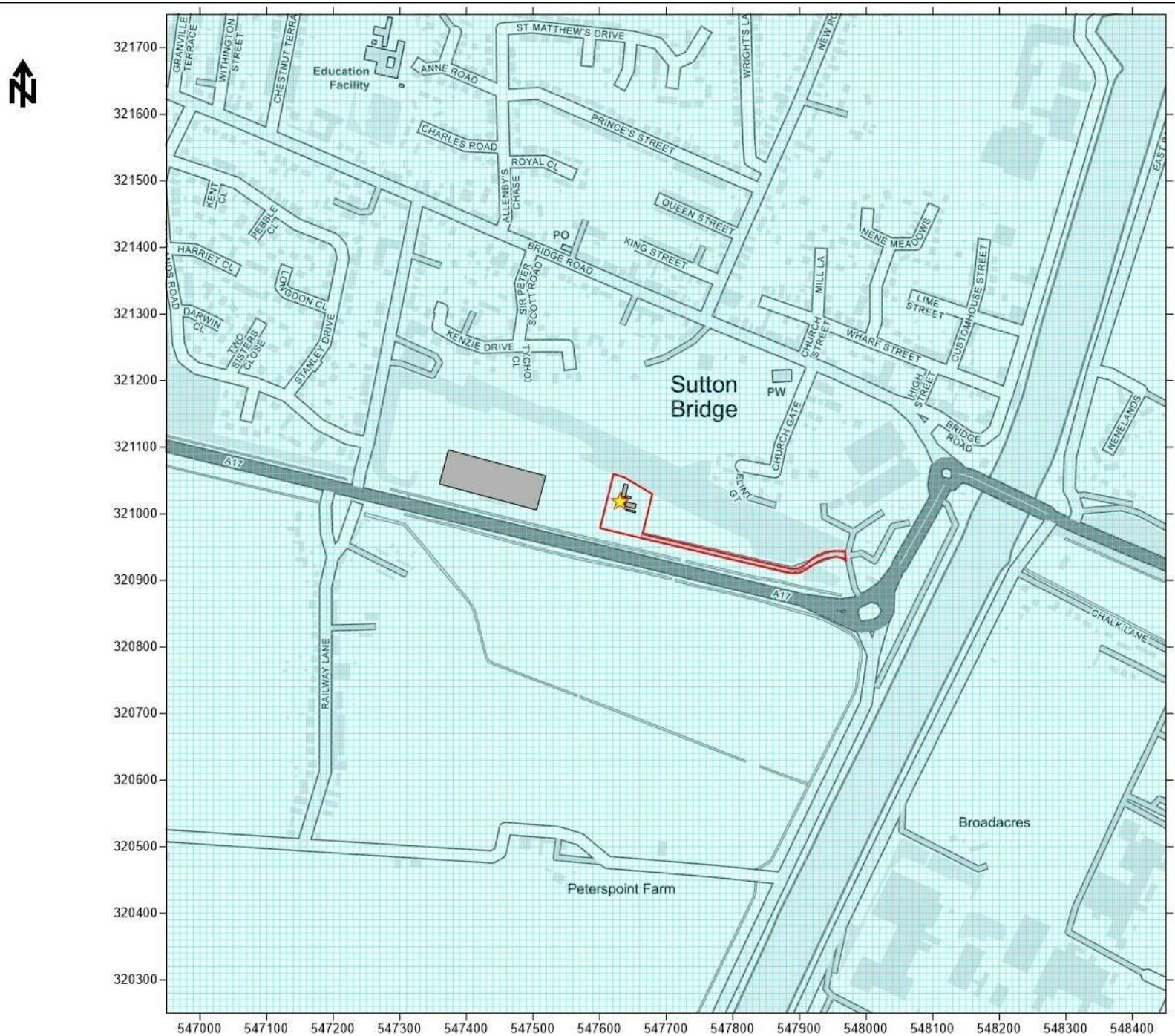
Figure 2 - Monitoring Locations

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Legend
Site Boundary
Receptor
Title
Figure 3 - Sensitive Receptor Locations
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Sutton Bridge
Education Facility
PO
PW
Broadacres
Peterspoint Farm
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
A17
ST MATTHEW'S DRIVE
ANNE ROAD
CHARLES ROAD
PRINCE'S STREET
ROYAL CL
QUEEN STREET
KING STREET
BRIDGE ROAD
KENZIE DRIVE
SIR PETER SCOTT ROAD
CHURCH STREET
WHARF STREET
HIGH STREET
CHURCH GATE
FLINT GT
MILL LA
LIME STREET
CUSTOMHOUSE STREET
NENE MEADOWS
NENELANDS
CHALK LANE
RAILWAY LANE
STANLEY DRIVE
HARRIET CL
DARWIN CL
KENT CL
PEBBLE CL
LOGDON CL
TWO SISTERS CLOSE
ALLENBY'S CHASE
WITHINGTON STREET
CHESTNUT TERRACE
GRANVILLE TERRACE
321700
321600
321500
321400
321300
321200
321100
321000
320900
320800
320700
320600
320500
320400
320300
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547100
547200
547300
547400
547500
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548200
548300
548400



Legend

- Site Boundary
- Stack
- Building
- Output Grid

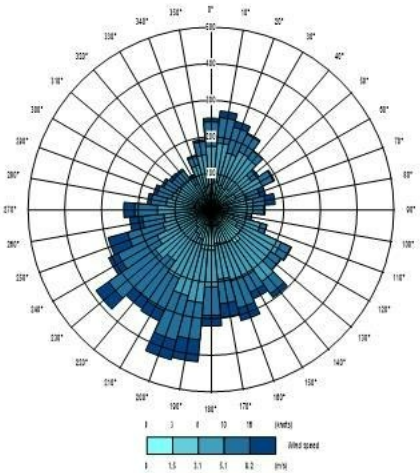
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Figure 4 - ADMS-6 Inputs

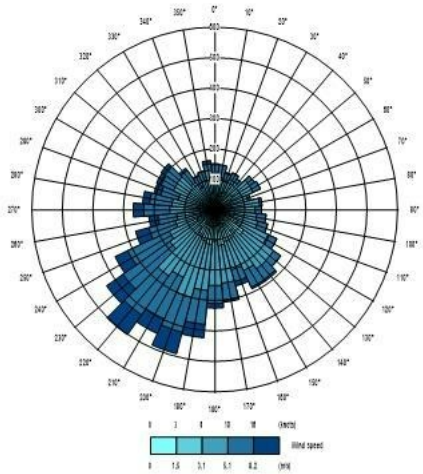
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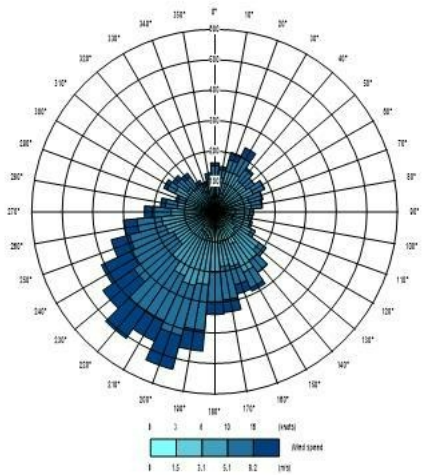
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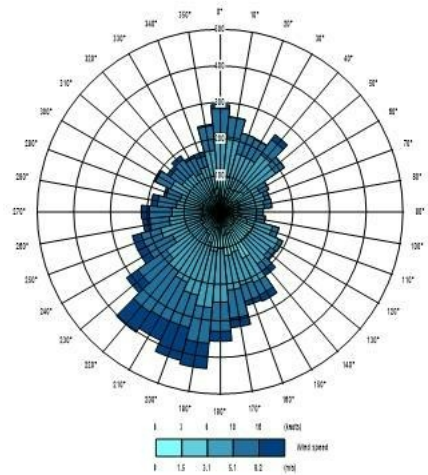
2018 Meteorological Data



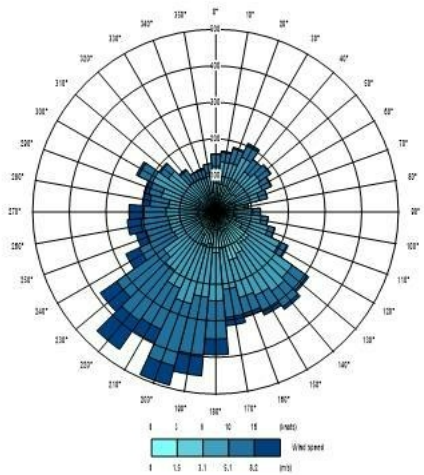
2019 Meteorological Data



2020 Meteorological Data



2021 Meteorological Data



2022 Meteorological Data

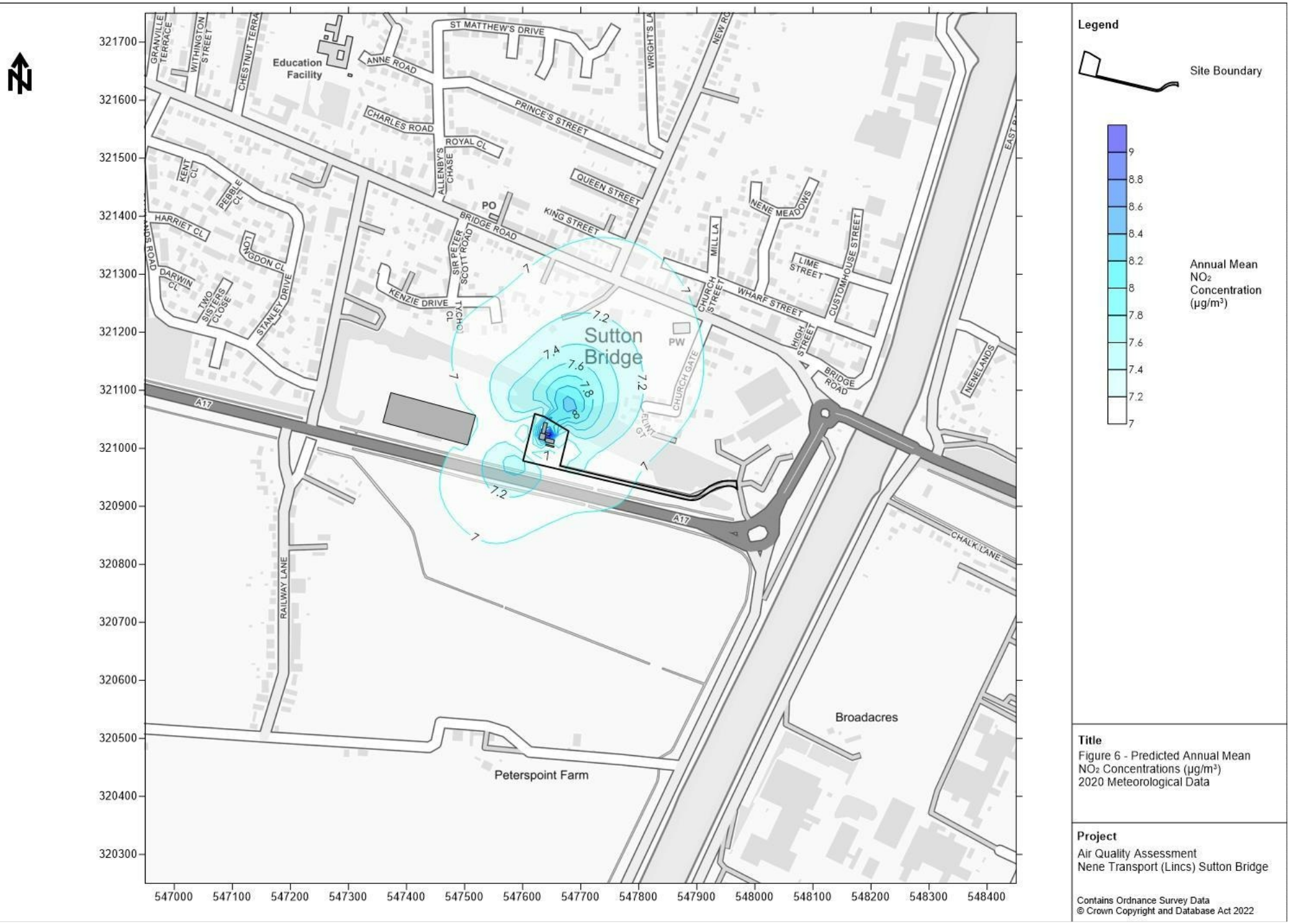
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Figure 5 - Wind Roses of 2018 to 2022 RAF Marham Meteorological Station Data

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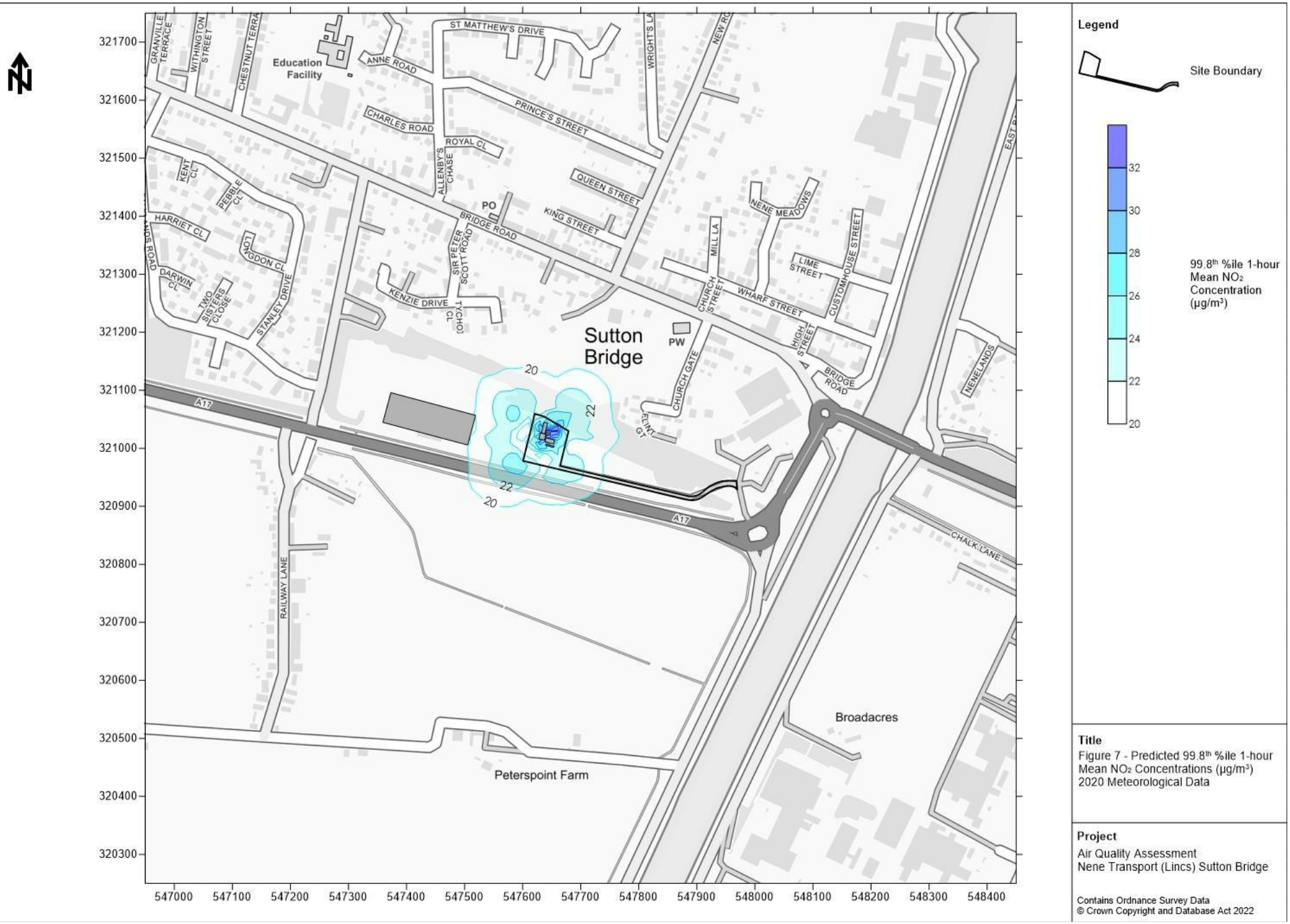
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Figure 6 - Predicted Annual Mean NO_2 Concentrations (µg/m³)
2020 Meteorological Data

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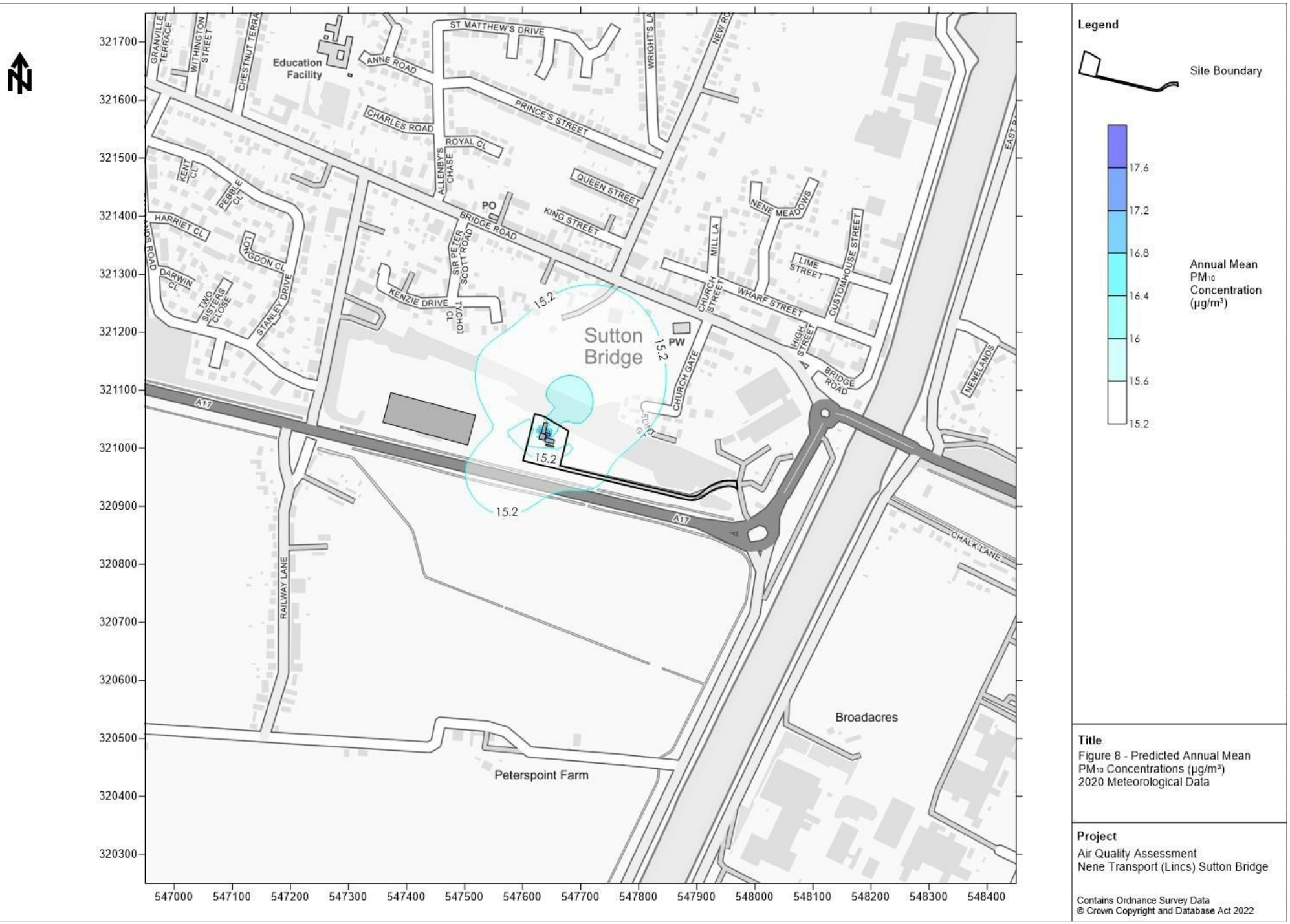
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Figure 7 - Predicted 99.8th %ile 1-hour Mean NO_2 Concentrations (µg/m³) 2020 Meteorological Data

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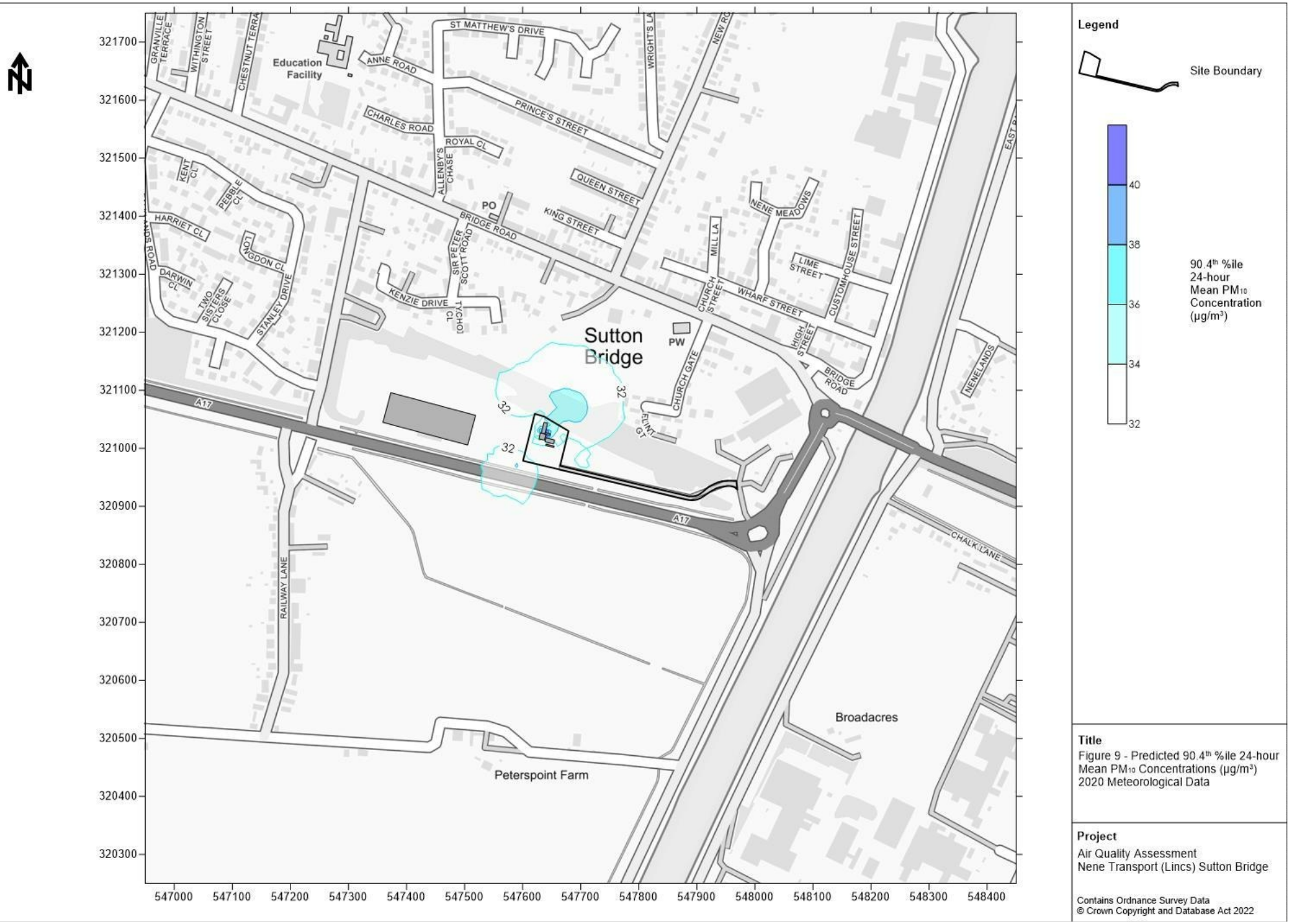
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Figure 8 - Predicted Annual Mean PM_{10} Concentrations (µg/m³)
2020 Meteorological Data

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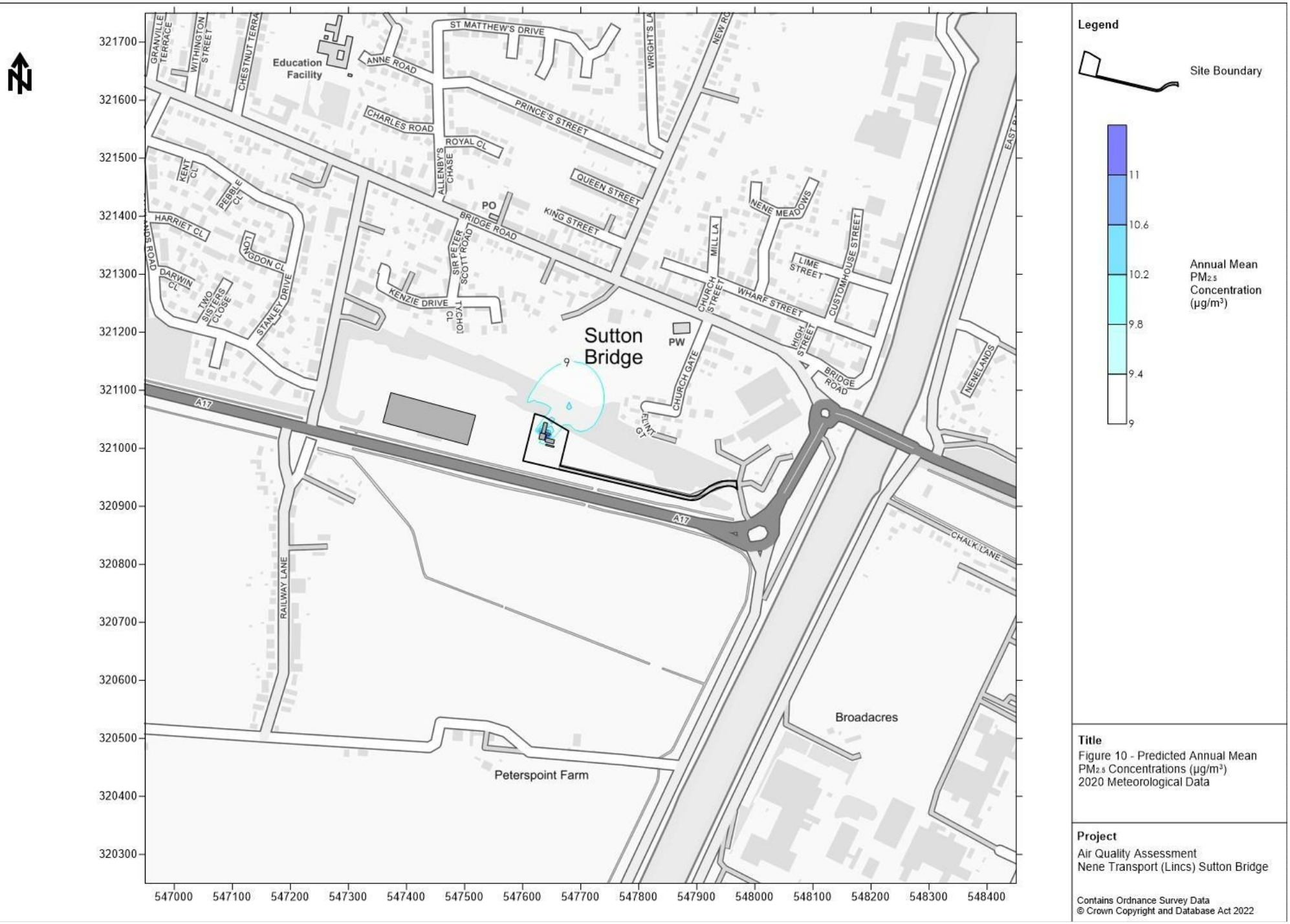
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Figure 9 - Predicted 90.4th %ile 24-hour Mean PM_{10} Concentrations (µg/m³) 2020 Meteorological Data

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Figure 10 - Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m³)
2020 Meteorological Data

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APPENDIX A - REPORT LIMITATIONS

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APPENDIX B - GLOSSARY

Air Quality Management Area	An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives.
Air Quality Objective	The name given to the maximum ambient pollutant concentration that is not to be exceeded either without exception or within a permitted number of exceedances over a specified timescale for a pollutant outlined in the national Air Quality Strategy.
Air Quality Strategy	A national government document which contains standards, objectives and measures for improving ambient air quality.
Background Concentration	The pollutant concentration assumed to represent baseline concentrations in the atmosphere across the modelled area.

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