

Ecological Air Quality Assessment
Castle Sidings, Rochdale

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Kellen Homes Limited to undertake an Ecological Air Quality Assessment in support of a residential development on land at Castle Sidings, Rochdale.

1.1.2 The proposals have the potential to cause changes in pollution levels at sensitive ecological locations as a result of road vehicle exhaust emissions associated with the development. An Ecological Air Quality Assessment was therefore undertaken in order to determine baseline conditions and assess potential impacts associated with the scheme.

1.2 Site Location and Context

1.2.1 The site is located on land at Castle Sidings, Rochdale, at approximate National Grid Reference (NGR): 387942, 410156. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise a full planning application for residential development, including access, car parking, landscaping, open space and associated engineering and infrastructure including an electric substation and foul water pump station.

1.3 Report Amendments

1.3.1 Following submission of the Ecological Air Quality Assessment, a consultation response from Natural England (NE)¹ raised concerns that the proposed development may have likely significant effects on the following ecological designations:

- Rochdale Canal Special Area of Conservation (SAC);
- Rochdale Canal Site of Special Scientific Interest (SSSI);
- Manchester Mosses SAC;
- Holcroft Moss SSSI;

¹ Planning consultation: 23/00431/HYBR, NE, 19th February 2024.

- Peak District Moors (South Pennine Moors Phase 1) Special Protection Area (SPA); and,
- South Pennine Moors Phase 2 SPA.

1.3.2 An updated Ecological Air Quality Assessment was therefore undertaken in order to consider the potential for changes in atmospheric pollution levels to impact the above designations. This is detailed in the following report.

1.3.3 It should be noted that this report only considers potential air quality impacts at ecological designations. Reference should be made to the Air Quality Assessment produced by Redmore Environmental (reference: 6299r3) for assessment of potential air quality impacts at human receptors.

2.0 **ASSESSMENT STAGES**

2.1.1 NE has produced 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations'² which describes how competent authorities and others will assess plans and projects likely to generate road traffic emissions and subsequently affect European sites. This provides a staged assessment methodology to provide consideration of potential air quality impacts from a development both alone and in-combination. The approach can be summarised as follows:

- Stage 1 - Determine the predicted change in Annual Average Daily Traffic (AADT) flow on road links within the vicinity of the ecological designation as a result of the development alone. If this is above 1,000 then there is a risk of a significant effect on air quality as a result of the development alone. As such, an Appropriate Assessment is required and dispersion modelling should be undertaken to quantify changes in pollution levels within the vicinity of the affected road links. If the change is below 1,000 then the assessment should proceed to Stage 2; and,
- Stage 2 - If the change is below 1,000 then there is a risk of an appreciable effect on air quality but is unlikely to be significant alone. As such, screening for in-combination effects should be undertaken. This requires the predicted change in AADT flow on road links within the vicinity of the ecological designation as a result of the development and any other relevant plans or projects to be determined. If this is below 1,000 then a likely significant effect can be ruled out and an Appropriate Assessment is not required. If the change is greater than 1,000 then an Appropriate Assessment is necessary and dispersion modelling should be undertaken to quantify changes in pollution levels within the vicinity of the affected road links. The results can then be analysed by the Project Ecologist to determine the potential for a likely significant effect.

2.1.2 The assessment results are summarised in the following Sections.

² Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations, NE, 2018.

3.0 **STAGE 1 ASSESSMENT**

3.1.1 Predicted vehicle trip generation from the proposed development on road links within 200m of the identified designations was provided by Eddisons, the Transport Consultants for the project. This is summarised in Table 1.

Table 1 Predicted Development Alone Change in AADT Flows

Link	Predicted Change in AADT Flow as a Result of the Development Alone	Potentially Affected Designation
Durban Street/ Hannover Street	432	Rochdale Canal SAC/SSSI
Heywood Road, east of Hannover Street	449	Rochdale Canal SAC/SSSI
Heywood Road, west of Hannover Street	881	Rochdale Canal SAC/SSSI
A664 Manchester Road	666	Rochdale Canal SAC/SSSI
M62 - east of Junction 10	0	Holcroft Moss SSSI
M62 - east of Junction 11	0	Manchester Mosses SAC
M62 - east and west of Junction 22	0	Peak District Moors (South Pennine Moors Phase 1) SPA South Pennine Moors Phase 2 SPA

3.1.2 As shown in Table 1, the Stage 1 Assessment indicated that the proposed development is not predicted to increase the AADT flow on any road link in the vicinity of any ecological designation by more than 1,000. As such, likely significant effects from the development alone can be ruled out and a Stage 2 Assessment was necessary.

3.1.3 It should be noted the proposed development alone is not predicted to increase traffic flows within 200m of the Holcroft Moss SSSI, Manchester Mosses SAC, Peak District Moors (South Pennine Moors Phase 1) SPA or the South Pennine Moors Phase 2 SPA. As such, any likely significant effect on these sites would be solely as a result of other relevant plans and projects. These would be subject to separate Habitats Regulations Assessment, with a requirement to mitigate any associated significant effect. It can therefore be concluded that the in-combination effects at these designations as a result of the development can be ruled out.

4.0 **STAGE 2 ASSESSMENT**

- 4.1.1 Predicted changes in AADT flows in the assessment year of 2025 as a result of the proposed development and other in-combination plans and projects, as well as predicted growth from the base year of 2019, on road links in the vicinity of the ecological designations were provided by Eddisons. This is summarised in Table 2.

Table 2 Predicted Development In-Combination Change in AADT Flows

Link	Predicted 2025 In-Combination Change in AADT Flow	Potentially Affected Designation
Durban Street/ Hannover Street	547	Rochdale Canal SAC/SSSI
Heywood Road, east of Hannover Street	542	Rochdale Canal SAC/SSSI
Heywood Road, west of Hannover Street	990	Rochdale Canal SAC/SSSI
A664 Manchester Road	2,425	Rochdale Canal SAC/SSSI

- 4.1.2 As shown in Table 2, the proposed development, in-combination with other plans and projects, is predicted to increase AADT flows on the A664 Manchester Road by more than 1,000 over 2019 levels by 2025. As such, in-combination effects at the Rochdale Canal SAC/SSSI cannot be screened as not significant. Dispersion modelling was therefore undertaken in order to quantify changes in pollution levels at discrete receptor locations at the Rochdale Canal SAC/SSSI.

5.0 DISPERSION MODELLING METHODOLOGY

5.1 Introduction

5.1.1 The assessment included the following stages:

- Identification of discrete receptor locations;
- Dispersion modelling of oxides of nitrogen (NO_x) and ammonia (NH₃) emissions from the relevant road sources;
- Post processing of model outputs to produce predictions of pollution levels both with and without the development in place; and,
- Comparison of modelling results with the relevant criteria.

5.1.2 The following Sections outline the methodology and inputs used for the assessment.

5.1.3 Reference was made to the following documents throughout the assessment:

- NE 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations'³; and,
- Institute of Air Quality Management (IAQM) 'A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites'⁴.

5.1.4 It should be noted that the dispersion model produced by Redmore Environmental for the Air Quality Assessment (reference: 6299r3) was used in order to ensure continuity within the project. As such, reference should be made to the original report for details of the following input parameters:

- Meteorological data;
- Land use characteristics;
- NO_x emission factors; and,
- Model verification procedure.

³ Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations, NE, 2018.

⁴ A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1, IAQM, 2020.

5.1.5 Any amendments to the original model are noted in the following Sections.

5.2 **Modelled Receptors**

5.2.1 Discrete receptor locations were included in the model to quantify changes in pollution levels throughout the Rochdale Canal SAC/SSSI. Transects were included at each location in order to provide analysis of pollution reduction with distance from source. The following format was utilised for receptor identification:

- EX-0 - Closest boundary of the SAC/SSSI to the roadside;
- EX-1 - 10m from the closest boundary of the SAC/SSSI to the roadside;
- EX-2 - 20m from the closest boundary of the SAC/SSSI to the roadside; and,
- EX-3 - 30m from the closest boundary of the SAC/SSSI to the roadside.

5.2.2 Receptor locations are summarised in Table 3.

Table 3 Discrete Receptor Locations

Receptor		NGR (m)		Distance from Roadside (m)
		X	Y	
E1-0	Rochdale Canal SAC/SSSI	388341.4	410534.7	0
E1-1	Rochdale Canal SAC/SSSI	388344.8	410544.2	10
E1-2	Rochdale Canal SAC/SSSI	388348.3	410553.6	20
E1-3	Rochdale Canal SAC/SSSI	388351.7	410563.0	30
E2-0	Rochdale Canal SAC/SSSI	388333.4	410508.9	0
E2-1	Rochdale Canal SAC/SSSI	388329.7	410499.5	10
E2-2	Rochdale Canal SAC/SSSI	388326.3	410490.2	20
E2-3	Rochdale Canal SAC/SSSI	388322.8	410480.8	30

5.2.3 Reference should be made to Figure 2 for a map of the discrete receptor locations.

5.3 Modelling Scenarios

5.3.1 Potential impacts have been defined by predicting NO_x and NH₃ concentrations and nitrogen deposition rates using dispersion modelling for the following scenarios:

- 2019 baseline - predicted pollution levels without committed developments or the proposed development;
- 2025 Do-Minimum (DM) - predicted pollution levels inclusive of committed developments but without the proposed development; and,
- 2025 Do-Something (DS) - predicted pollution levels with committed developments and the proposed development.

5.3.2 The change in pollution level as a result of the development has been described as the Process Contribution (PC) throughout this report.

5.3.3 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 development.

5.4 Environmental Quality Standards

5.4.1 A critical load is defined by the Air Pollution Information Service (APIS) website⁵ as

"A quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."

5.4.2 A critical level is defined as:

"Concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge."

⁵ www.apis.ac.uk.

- 5.4.3 A critical load refers to deposition of a pollutant, while a critical level refers to pollutant concentrations in the atmosphere (which usually have direct effects on vegetation or human health).
- 5.4.4 When pollutant loads (or concentrations) exceed the critical load or level it is considered that there is a risk of harmful effects. The excess over the critical load or level is termed the 'exceedence'. A larger exceedence is often considered to represent a greater risk of damage.
- 5.4.5 Maps of critical loads and levels and their exceedences have been used to show the potential extent of pollution damage and aid in developing strategies for reducing pollution. Decreasing deposition below the critical load is seen as a means for avoiding the risk of damage. However, even a decrease in an exceedence may infer that less damage will occur.
- 5.4.6 Table 4, presents the critical levels for the protection of vegetation for pollutants considered within this assessment.

Table 4 Critical Levels for the Protection of Vegetation

Pollutant	Critical Level	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO _x	30	Annual mean
NH ₃	1 ^(a)	Annual mean
	3 ^(b)	Annual mean

Note: (a) Specified for the protection of lichens and bryophytes.

(b) Specified for the protection of higher plants.

- 5.4.7 Review of the APIS website⁶ indicated that lichens and bryophytes are not present within the Rochdale Canal SAC/SSSI. As such, an annual mean NH₃ critical level of 3 $\mu\text{g}/\text{m}^3$ was used throughout the assessment.

⁶ www.apis.ac.uk.

5.4.8 Nitrogen deposition critical loads were obtained from the APIS website⁷. These are presented in Table 5.

Table 5 Critical Loads for Nitrogen Deposition

Feature	Broad Habitat	Relevant Nitrogen Critical Load Class	Nitrogen Critical Load (kgN/ha/yr)	
			Low	High
Luronium natans - Floating water-plantain (S1831)	Standing open water and canals	Permanent oligotrophic waters: Softwater lakes	3	10

5.4.9 In relation to the critical loads shown in Table 5, APIS states:

"The critical load only applies if the interest feature is associated with softwater oligotrophic or dystrophic lakes at the site. If the feature is not depending on these lake types, there is no comparable critical load available."

5.4.10 The Rochdale Canal SAC/SSSI is not a softwater oligotrophic or dystrophic lake and therefore there is no comparable critical load for the site. As such, the change in nitrogen deposition has been predicted and considered in the context of baseline levels, the affected areas and potential sensitivity of the designated feature.

5.5 Traffic Data

5.5.1 Traffic data for use in the assessment was taken from the Air Quality Assessment (reference 6299r3). However, the modelled area was simplified in order to reduce model run times. A summary of the traffic flows used in the Ecological Air Quality Assessment is provided in Table 6.

⁷ www.apis.ac.uk.

Table 6 Traffic Data

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2019	2025 DM	2025 DS			
L1	A664, Manchester Road, North of Partington Street	16,082	17,103	17,678	1.50	8.7	45
L2	A664, Manchester Road, Northbound (NB), South of A58, Slow Phase (SP)	5,355	5,695	5,839	2.88	6.9	30
L3	A664, Manchester Road, NB, Intersection with A58, SP	5,355	5,695	5,839	2.88	8.5	30
L4	A664, Manchester Road, NB, North of A58, SP	15,926	16,937	17,081	2.98	8.8	30
L5	A58, Manchester Road, Eastbound (EB), Intersection with A664/B6452, SP	15,926	16,937	17,009	2.98	11.3	30
L6	A58, Manchester Road, EB, East of A664 Edinburgh Way, SP	17,889	19,025	19,097	3.71	11.5	30
L7	A58, Manchester Road, EB, West of Kemp Avenue	17,889	19,025	19,097	3.71	6.8	40
L8	A58, Manchester Road, EB, East of Kemp Avenue	17,889	19,025	19,097	3.71	6.9	55
L9	A58, Manchester Road, Westbound (WB), East of Kemp Avenue	18,933	20,135	20,207	3.22	6.8	55
L10	A58, Manchester Road, WB, West of Kemp Avenue	18,933	20,135	20,207	3.22	7.2	40
L11	A58, Manchester Road, WB, East of A664 Edinburgh Way, SP	18,933	20,135	20,207	3.22	10.2	30
L12	A58, Manchester Road, WB, Intersection with A664/B6452, SP	14,973	15,924	16,067	3.35	6.4	30
L13	A58, Manchester Road, WB, West of A664 Edinburgh Way, SP	14,973	15,924	16,067	3.35	7.5	30
L14	A58, Manchester Road, WB, North of A58, Bolton Road	14,973	15,924	16,067	3.35	7.0	45
L15	A664, Manchester Road, Southbound (SB), South of A58, SP	5,355	5,695	5,839	2.88	4.5	30
L16	A664, Manchester Road, NB Slip onto A58, Bolton Road, SP	5,355	5,695	5,983	2.88	5.8	30

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2019	2025 DM	2025 DS			
L17	A58, Bolton Road, West of A664/A58, Manchester Road	17,136	18,224	18,511	3.16	11.7	45
L18	A58, Bolton Road, EB, West of A664, SP	5,706	6,069	6,212	4.28	3.4	30
L19	A58, Bolton Road, EB, East of A664, SP	5,706	6,069	6,212	9.48	5.6	30
L20	A58, Bolton Road, WB, East of A664, SP	5,706	6,069	6,069	9.48	10.1	30
L21	A58, Bolton Road, WB, West of A664, SP	5,706	6,069	6,212	9.48	6.0	30
L22	A58, Bolton Road, EB Slip onto A58, Manchester Road, SP	5,706	6,069	6,069	9.48	6.2	30
L23	A58, Manchester Road, EB, North of A58, Bolton Road	15,926	16,937	17,081	2.98	9.9	45
L24	B6452, Roch Valley Way, North of Roch Mills Crescent	9,997	10,632	10,775	2.34	7.3	60
L25	B6452, Roch Valley Way, South of Roch Mills Crescent	9,997	10,632	10,775	2.34	11.2	40
L26	B6452, Roch Valley Way, SB Slip onto A58, Manchester Road, SP	3,329	3,540	3,540	7.03	5.8	30
L27	B6452, Roch Valley Way, SB, North of A58, Manchester Road, SP	3,329	3,540	3,612	7.03	12.4	30
L28	B6452, Roch Valley Way, NB, North of A58, Manchester Road, SP	3,329	3,540	3,612	7.03	5.1	30
L29	A664, Manchester Road, EB, Slip from A58, Manchester Road, SP	8,731	9,285	9,285	5.68	7.6	30
L30	A664, Manchester Road, EB, South of A58, Manchester Road	8,731	9,285	9,285	5.68	7.6	30
L31	A664, Manchester Road, WB, South of A58, Manchester Road	9,296	9,886	9,886	5.83	12.1	30
L32	A664, Manchester Road, WB, Slip to A58, Manchester Road, SP	9,296	9,886	9,886	5.83	7.8	30
L33	A664, Manchester Road, WB, Intersection with A58, SP	9,296	9,886	9,886	5.83	9.1	30

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2019	2025 DM	2025 DS			
L34	A664, Manchester Road, EB, Intersection with A58, SP	17,461	18,570	18,570	2.84	8.2	30
L35	A664, Manchester Road, EB, West of A627(M)	17,461	18,570	18,570	2.84	7.5	55
L36	A664, Manchester Road, EB, West of A627(M)	18,591	19,772	19,772	2.92	7.3	55
L37	Royle Barn Road SP	3,914	4,163	4,228	0.00	9.8	30
L38	A664, Manchester Road between Royle Barn Road and Durban Street	19,012	20,219	20,867	1.50	9.5	45
L39	A664, Manchester Road between Durban Street and Heywood Road	18,355	19,521	19,737	1.50	9.3	45
L40	A664, Manchester Road north of A664 Queensway	18,902	20,103	20,768	1.50	7.3	45
L41	A664, Manchester Road at A664 Queensway junction SP	18,902	20,103	20,435	1.50	7.3	30
L42	A664, Manchester Road south of A664 Queensway	18,902	20,103	20,435	1.50	7.9	45
L43	A664, Manchester Road Queensway	12,076	12,843	13,176	1.50	6.9	45
L44	Heywood Road SP	1,361	1,448	1,466	0.00	6.6	30
L45	Hanover Street/Durban Street	1,690	1,797	2,229	0.00	6.2	30
L46	Heywood Road east of Heape Street	1,361	1,448	1,897	2.89	6.9	35
L47	Heywood Rod west of Heape Street	745	792	792	2.89	6.2	35
L48	Heywood Road west of Partington Street	745	792	1,217	2.89	6.5	35
L49	Fairway west of site access	1,608	1,710	2,134	0.00	6.9	35
L50	Fairway east of site access	1,608	1,710	2,591	0.00	6.8	35
L51	Partington Street	1,203	1,280	1,704	0.00	5.1	35

5.5.2 Reference should be made to Figure 2 for a graphical representation of the road link locations.

5.6 **Baseline Pollution Levels**

5.6.1 Baseline annual mean nitrogen dioxide (NO₂) and NO_x concentrations were obtained from the Department for Environment, Food and Rural Affairs (DEFRA) website⁸ for each discrete receptor location. Baseline annual mean NH₃ concentrations and nitrogen deposition rates were obtained from the APIS website⁹. The relevant values are summarised in Table 7 for 2019.

Table 7 Baseline Pollution Levels - 2019

Receptor		Annual Mean Concentration (µg/m ³)			Annual Nitrogen Deposition Rate (kgN/ha/yr)
		NO _x	NO ₂	NH ₃	
E1-0	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3
E1-1	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3
E1-2	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3
E1-3	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3
E2-0	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3
E2-1	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3
E2-2	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3
E2-3	Rochdale Canal SAC/SSSI	24.46	17.48	2.14	25.3

5.6.2 The baseline levels for 2025 are summarised in Table 8.

⁸ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

⁹ UK Air Pollution Information System, www.apis.ac.uk.

Table 8 Baseline Pollution Levels - 2025

Receptor		Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)			Annual Nitrogen Deposition Rate ($\text{kgN}/\text{ha}/\text{yr}$)
		NO_x	NO_2	NH_3	
E1-0	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3
E1-1	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3
E1-2	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3
E1-3	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3
E2-0	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3
E2-1	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3
E2-2	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3
E2-3	Rochdale Canal SAC/SSSI	18.35	13.53	2.14	25.3

5.7 Emission Factors

- 5.7.1 Emission factors of NH_3 for each link were calculated using the relevant traffic flows and the Calculator for Road Emissions of Ammonia (CREAM) workbook released by Air Quality Consultants Ltd (AQC) in 2020. Reference should be made to the accompanying report¹⁰ for details of the calculation methodology.

5.8 NO_x to NO_2 Conversion

- 5.8.1 Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 8.1) provided by DEFRA. This is the method detailed within DEFRA guidance¹¹.

5.9 Nitrogen Deposition

- 5.9.1 Nitrogen deposition rates were calculated using the conversion factors provided within the IAQM document 'A guide to the assessment of air quality impacts on designated

¹⁰ Ammonia Emissions from Roads for Assessing Impacts on Nitrogen-sensitive Habitats, AQC, 2020.

¹¹ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

nature conservation sites¹². Predicted pollutant concentrations were multiplied by the relevant deposition velocity and conversion factor to calculate the speciated dry deposition flux. The conversion factors used for the determination of nitrogen deposition are presented within Table 9.

Table 9 Conversion Factors to Determine Dry Deposition Flux for Nitrogen Deposition

Pollutant	Deposition Velocity (m/s)		Conversion Factor ($\mu\text{g}/\text{m}^2/\text{s}$ to $\text{kg}/\text{ha}/\text{yr}$ of pollutant species)
	Grassland	Forest	
NO ₂	0.0015	0.003	95.9
NH ₃	0.020	0.030	260

5.9.2 The relevant deposition velocity for forest habitat were selected from Table 9 and used throughout the assessment based on the vegetation type at the discrete receptor locations.

5.10 Significance

5.10.1 The IAQM guidance¹³ states that if likely significant effects cannot be screened out by the air quality practitioner, then suitable data should be provided to the Project Ecologist to assist with the determination of the effect significance. A requirement for the stated approach is provided in Section 6.0, where necessary.

¹² A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1., IAQM, 2020.

¹³ A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1., IAQM, 2020.

6.0 DISPERSION MODELLING RESULTS

6.1 Introduction

6.1.1 Dispersion modelling was undertaken with the inputs described in Section 5.0. The results are summarised in the following Sections.

6.2 Oxides of Nitrogen

6.2.1 Annual mean NO_x concentrations were predicted at the sensitive receptor locations for the 2019 baseline, 2025 DM and 2025 DS scenarios. These are summarised in Table 10.

Table 10 Predicted Annual Mean NO_x Concentrations

Receptor		Predicted Annual Mean NO _x Concentration (µg/m ³)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E1-0	Rochdale Canal SAC/SSSI	30.6	24.9	25.1	0.2	-5.5	0.7	-18.4
E1-1	Rochdale Canal SAC/SSSI	29.7	23.9	24.1	0.2	-5.6	0.6	-18.7
E1-2	Rochdale Canal SAC/SSSI	28.9	23.1	23.2	0.1	-5.7	0.5	-18.9
E1-3	Rochdale Canal SAC/SSSI	28.3	22.4	22.6	0.1	-5.7	0.4	-19.1
E2-0	Rochdale Canal SAC/SSSI	28.9	23.0	23.2	0.1	-5.7	0.5	-18.9
E2-1	Rochdale Canal SAC/SSSI	28.1	22.2	22.4	0.1	-5.8	0.4	-19.2
E2-2	Rochdale Canal SAC/SSSI	27.6	21.7	21.8	0.1	-5.8	0.4	-19.3

Receptor		Predicted Annual Mean NO _x Concentration (µg/m ³)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E2-3	Rochdale Canal SAC/SSSI	27.2	21.2	21.3	0.1	-5.8	0.3	-19.5

NOTE: (a) Development alone.

(b) Development in-combination.

- 6.2.2 As indicated in Table 10, predicted annual mean NO_x concentrations were below the relevant critical level of 30µg/m³ for the 2025 DM and 2025 DS scenarios. This indicates compliance with the relevant criteria following changes in pollution levels associated with the development both alone and in-combination. Critical levels are defined on the APIS website¹⁴ as follows:

"concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge."

- 6.2.3 As such, in accordance with the above definition, direct adverse effects are not predicted at any receptor and likely significant effects can be ruled out.

6.3 Ammonia

- 6.3.1 Annual mean NH₃ concentrations were predicted at the sensitive receptor locations for the 2019 baseline, 2025 DM and 2025 DS scenarios. These are summarised in Table 11.

¹⁴ http://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788050.

Table 11 Predicted Annual Mean NH₃ Concentrations

Receptor		Predicted Annual Mean NH ₃ Concentration (µg/m ³)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E1-0	Rochdale Canal SAC/SSSI	2.85	2.90	2.92	0.02	0.07	0.8	2.3
E1-1	Rochdale Canal SAC/SSSI	2.74	2.78	2.80	0.02	0.06	0.7	1.9
E1-2	Rochdale Canal SAC/SSSI	2.65	2.68	2.70	0.02	0.05	0.6	1.6
E1-3	Rochdale Canal SAC/SSSI	2.58	2.61	2.62	0.01	0.04	0.5	1.4
E2-0	Rochdale Canal SAC/SSSI	2.64	2.68	2.69	0.02	0.05	0.6	1.6
E2-1	Rochdale Canal SAC/SSSI	2.56	2.58	2.60	0.01	0.04	0.5	1.4
E2-2	Rochdale Canal SAC/SSSI	2.49	2.52	2.53	0.01	0.03	0.4	1.2
E2-3	Rochdale Canal SAC/SSSI	2.45	2.47	2.48	0.01	0.03	0.3	1.0

NOTE: (a) Development alone.

(b) Development in-combination.

6.3.2 As indicated in Table 11, predicted annual mean NH₃ concentrations were below the relevant critical level of 3µg/m³ at all receptors for all scenarios. As such, in accordance with the above definition, direct adverse effects are not predicted and likely significant effects can be ruled out.

6.3.3 It is noted that annual mean NH₃ concentrations are predicted to increase between 2019 and 2025. This is due to controls on exhaust NO_x emissions and the anticipated shift in fleet towards vehicles requiring abatement with associated potential for NH₃ slip.

6.3.4 No improvement in background NH₃ concentrations has been assumed up to 2025. This is likely to overestimate total pollution levels as government policies, including those outlined in the 'Clean Air Strategy 2019'¹⁵, are designed to reduce NH₃ emissions. Measures aimed at the agricultural sector, which caused 88% of UK NH₃ emissions during 2016, are predicted to reduce overall emissions by 9% against a 2016 baseline by 2020 and 23% by 2030¹⁶. As such, the future year predictions should be viewed with caution.

6.4 Nitrogen Deposition

6.4.1 Annual nitrogen deposition was predicted at the sensitive receptor locations for the 2019 baseline, 2025 DM and 2025 DS scenarios. These are summarised in Table 12.

Table 12 Predicted Annual Nitrogen Deposition

Receptor		Predicted Annual Nitrogen Deposition (kgN/ha/yr)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E1-0	Rochdale Canal SAC/SSSI	29.48	29.74	29.88	0.14	0.40	0.48	1.36
E1-1	Rochdale Canal SAC/SSSI	28.85	29.07	29.19	0.12	0.34	0.42	1.19
E1-2	Rochdale Canal SAC/SSSI	28.29	28.48	28.58	0.10	0.29	0.35	1.02
E1-3	Rochdale Canal SAC/SSSI	27.89	28.05	28.14	0.09	0.25	0.31	0.89
E2-0	Rochdale Canal SAC/SSSI	28.26	28.45	28.55	0.10	0.29	0.35	1.02
E2-1	Rochdale Canal SAC/SSSI	27.75	27.91	27.99	0.08	0.24	0.30	0.86

¹⁵ Clean Air Strategy 2019, DEFRA, 2019.

¹⁶ Clean Air Strategy 2019, DEFRA, 2019.

Receptor		Predicted Annual Nitrogen Deposition (kgN/ha/yr)					Change Between DM and DS (PC) as Prop. Of CL (%) ^(a)	Change Between Baseline and DS (PC) as Prop. Of CL (%) ^(b)
		2019 Baseline	2025 DM	2025 DS	Change Between DM and DS (PC) ^(a)	Change Between Baseline and DS (PC) ^(b)		
E2-2	Rochdale Canal SAC/SSSI	27.38	27.52	27.59	0.07	0.20	0.26	0.74
E2-3	Rochdale Canal SAC/SSSI	27.11	27.22	27.28	0.06	0.18	0.22	0.65

NOTE: (a) Development alone.

(b) Development in-combination.

6.4.2 As stated previously, there is no comparable critical load for nitrogen deposition for the Rochdale Canal SAC/SSSI. However, as shown in Table 12, the predicted increase as a result of the development alone is very small and does not exceed 1% of the baseline value at any receptor. The IAQM guidance¹⁷ states the following in relation to the use of a 1% impact criterion:

"A change of such magnitude, i.e. two orders below the criterion for harm to occur, is challenging to measure (even by the most precise air quality instrument) and difficult to distinguish from natural fluctuations in measured data (due to other variables such as variations in emissions and weather). For this reason, and others, it has been used as a precautionary screening criterion.

The 1% threshold has become widely used throughout the air quality assessment profession to define a reasonable quantum of long term pollution which is not likely to be discernible from fluctuations in background/measurements. For example, for many habitats, 1% of the critical load for nitrogen deposition equates to a very small change of less than 0.1kgN/ha/yr, well within the expected normal variation in deposition."

6.4.3 Based on the above, likely significant effects associated with the development alone can be ruled out.

¹⁷ A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1., IAQM, 2020.

6.4.4 As shown in Table 12, the predicted increase in nitrogen deposition as a result of the development in-combination is slightly above 1% at receptors E1-0 to E1-2 and E2-0. These represent locations to the north of Manchester Road which are occupied by Lock 51 of the Rochdale Canal. Due to mechanical aggravation of the water and substrate associated with the operation of the lock and associated vessel movements, it is considered unlikely the receptors would represent locations of suitable habitat for the qualifying feature. As such, any predicted increase at these positions is not considered likely to affect the integrity of the designation. Likely significant effects associated with the development both alone and in-combination can therefore be ruled out.

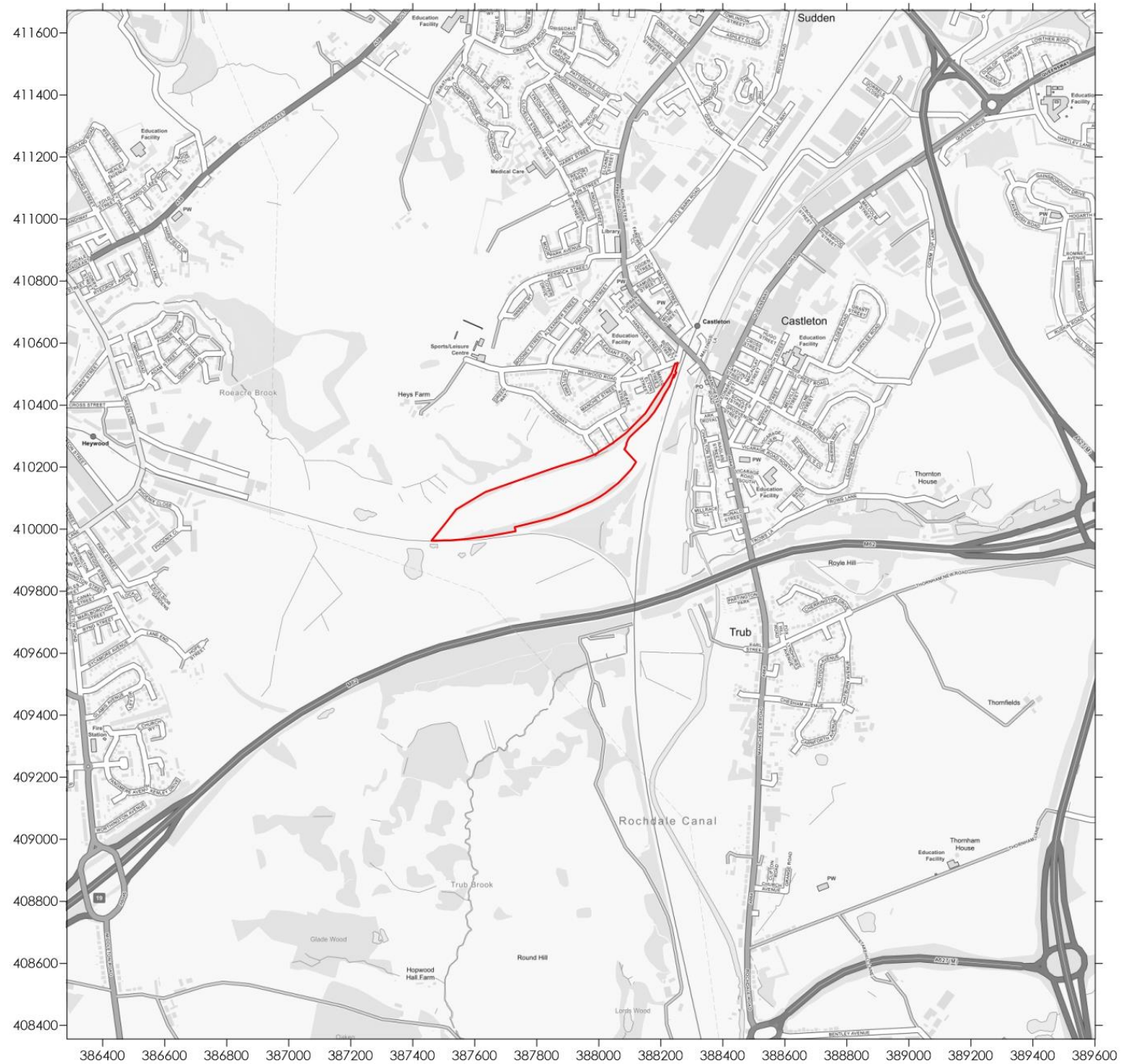
7.0 CONCLUSION

- 7.1.1 Redmore Environmental Ltd was commissioned by Kellen Homes Limited to undertake an Ecological Air Quality Assessment in support of a residential development on land at Castle Sidings, Rochdale.
- 7.1.2 Following submission of the Ecological Air Quality Assessment, a consultation response from NE raised concerns that the proposed development may have likely significant effects on a number of ecological designations as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. As such, an updated Ecological Assessment was undertaken to consider the potential for changes in atmospheric pollution levels to impact the stated designations.
- 7.1.3 Screening of anticipated increases in traffic flows as a result of the development indicated likely significant effects at the Rochdale Canal SAC/SSSI could not be ruled out. Dispersion modelling was therefore undertaken in order quantify potential impacts on annual mean NO_x, NH₃ concentrations and annual nitrogen deposition.
- 7.1.4 The results of the dispersion modelling assessment indicated that predicted annual mean concentrations of NO_x and NH₃ were below the relevant critical levels at all receptors for the future year scenarios. As such, likely significant effects can be ruled out.
- 7.1.5 There is no comparable critical load for nitrogen deposition for the Rochdale Canal SAC/SSSI. However, the predicted increase as a result of the development alone was very small and does not exceed 1% of the baseline value at any receptor. The predicted increase as a result of the development in-combination was slightly above 1% at receptors E1-0 to E1-2 and E2-0. These represent locations occupied by Lock 51 of the Rochdale Canal. Due to mechanical aggravation of the water and substrate associated with operation of the lock and associated vessel movements, it is considered unlikely the receptors would represent locations of suitable habitat for the qualifying feature. As such, any predicted increase in nitrogen deposition at these positions is not considered likely to affect the integrity of the designation. Likely significant effects associated with the development both alone and in-combination can therefore be ruled out.

8.0 **ABBREVIATIONS**

AADT	Annual Average Daily Traffic
APIS	Air Pollution Information System
AQC	Air Quality Consultants Ltd
CREAM	Calculator for Road Emissions of Ammonia
DEFRA	Department for Environment, Food and Rural Affairs
DM	Do Minimum
DS	Do Something
HRA	Habitats Regulations Assessment
IAQM	Institute of Air Quality Management
NE	Natural England
NH ₃	Ammonia
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
PC	Process Contribution
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest

Figures



Legend



Site Boundary

Title

Figure 1 - Site Location Plan

Project

Ecological Air Quality Assessment
Castle Sidings, Rochdale

Project Reference

6299-1

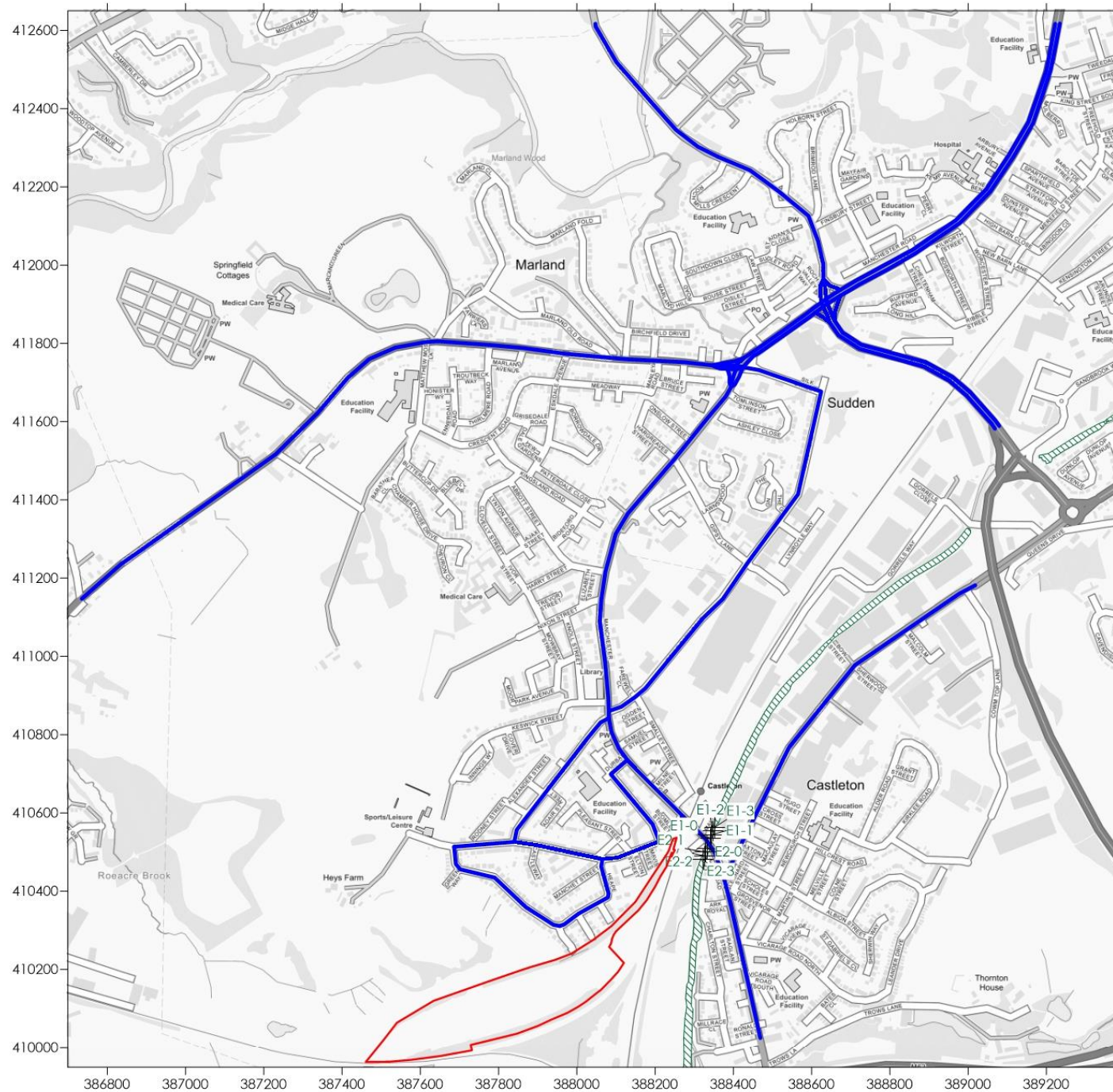
Client

Kellen Homes Limited

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Legend

-  Site Boundary
-  Receptor
-  Road Link
-  Rochdale Canal SAC

Title

Figure 2 - ADMS-Roads Inputs

Project

Ecological Air Quality Assessment
Castle Sidings, Rochdale

Project Reference

6299-1

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