

RAIN CITY DEVELOPMENTS (DUCIE STREET) LTD

The Mill House
6, Worsley Rd
Worsley
Manchester
M28 2NL

Mr Mike McManus

29 November 2018

Subject: Lomax Street, Manchester – Air Quality Assessment addendum
Our ref: L-21613-2.4.2-18-647-KRJ

Dear Mr McManus,

Introduction

Rain City Developments (Ducie Street) Ltd proposes to redevelop an existing car park situated between Lomax Street and Ducie Street in Manchester, to provide an eight-storey residential building including 41 apartments.

An Air Quality Assessment (AQA) reference AQA-21613-18-186 was prepared by Idom Merebrook (Merebrook) in April 2018 to accompany the planning application (reference 120149/FO/2018).

The site is situated within an Air Quality Management Area (AQMA) which has been declared in respect of annual mean NO₂ concentrations. Monitoring data from a representative location in the vicinity of the site indicates that concentrations of air pollutants are likely to be close to the relevant AQO for nitrogen dioxide (NO₂) but well below the relevant AQO for particulate matter (PM₁₀ and PM_{2.5}).

Due to elevated concentrations of NO₂ in the vicinity, it was recommended that monitoring be undertaken at the subject site to confirm the baseline concentrations and the requirement for any mitigation measures to protect future residents from exposure to air pollution.

The approach was agreed with Laura Miller, Environmental Health Officer (EHO) at Manchester City Council (MCC).

This addendum report presents the results of the site-specific monitoring and should be read in conjunction with the original AQA submitted with the planning application.

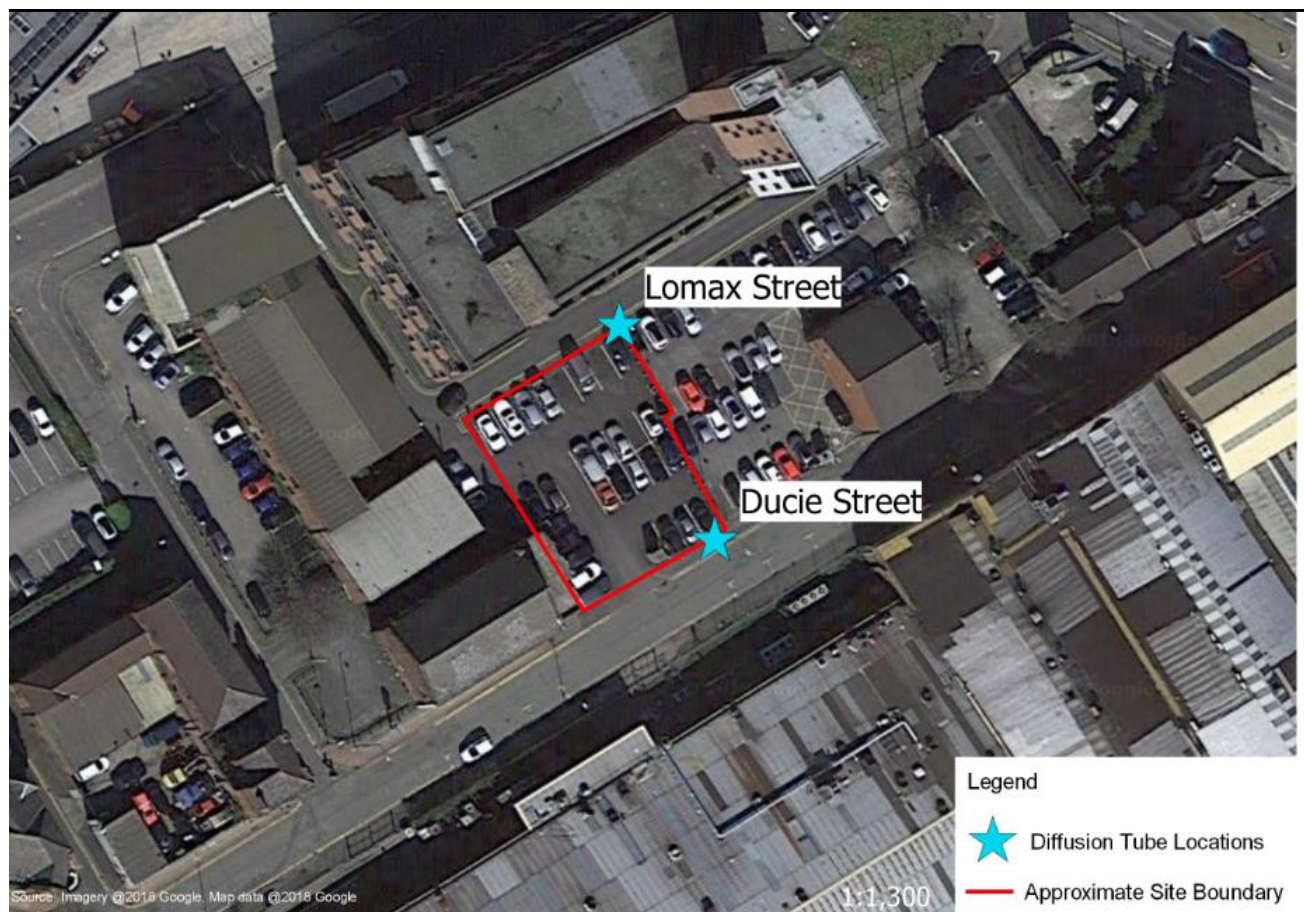
Methodology

Monitoring was undertaken for a period of three months (the minimum period recommended in the DEFRA statutory guidance¹) between 27 June and 27 September 2018. Diffusion tubes were deployed at three locations, two on the boundary of the proposed development site and one co-located with an automatic analyser to allow a site-specific co-location bias factor to be derived.

¹ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

The tubes at the site were installed on lampposts in the northeast and southeast corners of the site at a height of 2.5 m as shown on the figure below

Figure 1: Monitoring locations at the proposed development site



The monitoring sites are summarised in Table 1 below and were chosen to be representative of worst-case exposure being situated along the site boundary closest to the ring road (approximately 60 m to the east).

Table 1: Monitoring Locations

Installation site	x	y	Distance from kerb (approx.)
Lomax Street – roadside	385012	398260	1.5 m
Ducie Street – roadside	385020	398245	<0.5 m
Co-located with Oxford Road continuous analyser.	384233	397287	1 m

Monitoring results from the three-month monitoring period were annualised and bias-adjusted in order to estimate annual mean NO₂ concentrations at the monitoring sites and facilitate direct comparison of the measurement data to the relevant AQO. Full details are provided in the enclosed report.

Results

Table 2: Annualised and bias-adjusted monitoring results

Installation site	Bias-adjusted NO ₂ concentration (µg.m ⁻³)
Lomax Street	37.69
Ducie Street	41.97

The results of the survey and subsequent data analysis indicate that predicted annual mean NO₂ concentrations are below the annual mean Air Quality Objective (AQO) of 40 µg.m⁻³ at the Lomax Street monitoring site and slightly above the AQO at the Ducie Street monitoring site.

The Ducie Street monitoring site is situated less than 0.5 m from the kerb compared with the proposed development façade which is approximately 4 m from the kerb². In addition, concentrations are likely to reduce as a result of the anticipated reduction in vehicle movements associated with replacement of the existing car park on site with the proposed development.

Conclusions

With reference to the enclosed elevation sections, the lowest residential exposure along the Ducie St façade is at ground level whereas but the first residential exposure along the Lomax St façade is at 1st floor level.

The relevant exposure heights (1.5 m above finished floor level) are estimated to be 2.68 m above adjacent ground level along the Ducie Street facade (at ground floor level) and 5.55 m along the Lomax Street façade (at first floor level). Due to health and safety restrictions, the tubes were installed at a height of 2.5 m above adjacent ground level at each of the monitoring locations.

Annual mean concentrations of NO₂ at the Ducie Street monitoring site are estimated to be slightly above the AQO. However, residential exposure along the Ducie Street façade will be at greater distance compared with the monitoring site both in terms of distance from the kerb and height above ground level. In light of this, and the fact that vehicle numbers are expected to reduce as a result of the proposed development, it is considered unlikely that the concentrations to which future residents will be exposed will exceed the annual mean AQO of 40 µg.m⁻³

In outdoor amenity areas (balconies), the short-term AQO for NO₂ is considered to be more relevant than the annual mean due to the anticipated short duration of exposure in such areas. With reference to the DEFRA guidance¹, research has identified that exceedances of the short-term AQO for NO₂ are unlikely to occur where the annual mean is below 60 µg.m⁻³. As the annual mean concentration is well below 60 µg.m⁻³, it can be assumed that the short-term AQO is not exceeded at the ground floor balconies along Ducie Street.

The proposed development is therefore considered to be suitable for the proposed residential development without the requirement to provide mitigation against exposure to air pollution. It is recommended that this report is submitted to MCC for approval.

² This distance has been measured to the closest habitable room rather than the balcony where exposure would be expected to be of limited duration.

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Our ref: L-21613-2.4.2-18-647-KRJ
Page: 4/4



Yours sincerely,

A handwritten signature in black ink, appearing to read "Kat Johnson".

Kat Johnson
Associate Director

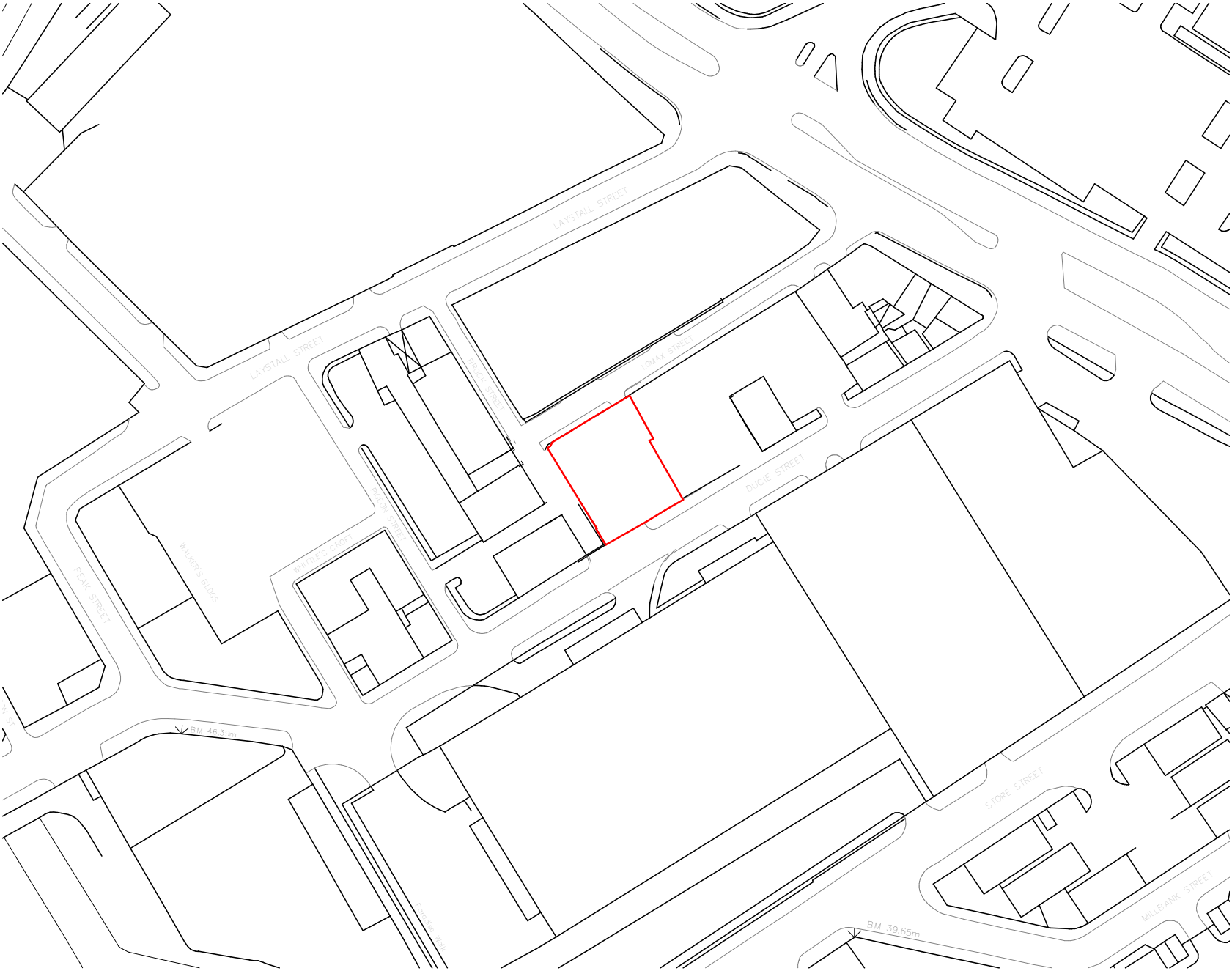


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Knott Mill
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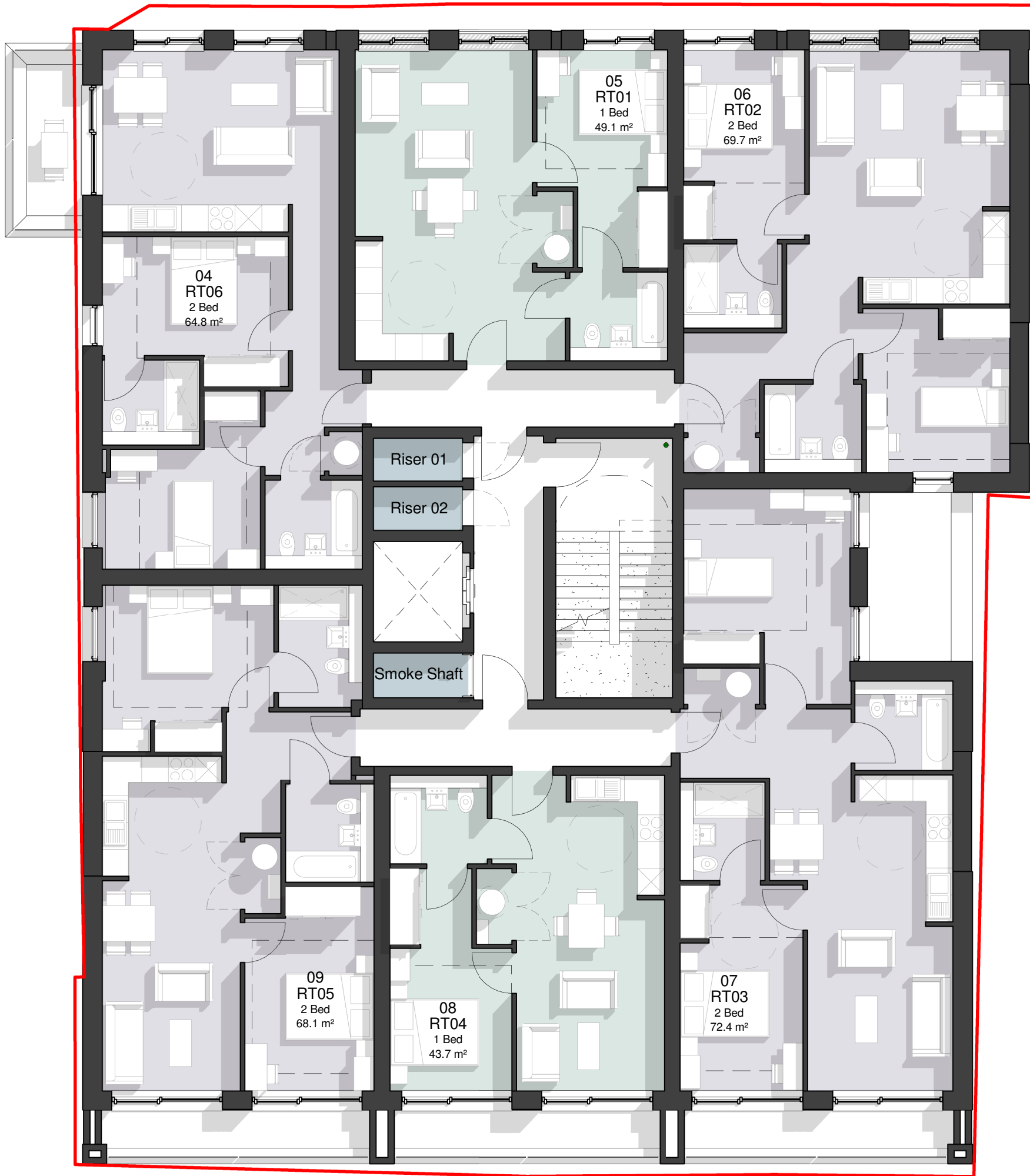
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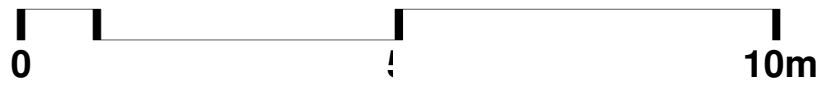
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Title	Location Plan
Status	Planning
Project number	0303
Date	Issue Date
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Location Plan
1 : 1250



GA_Level 1
1 : 100



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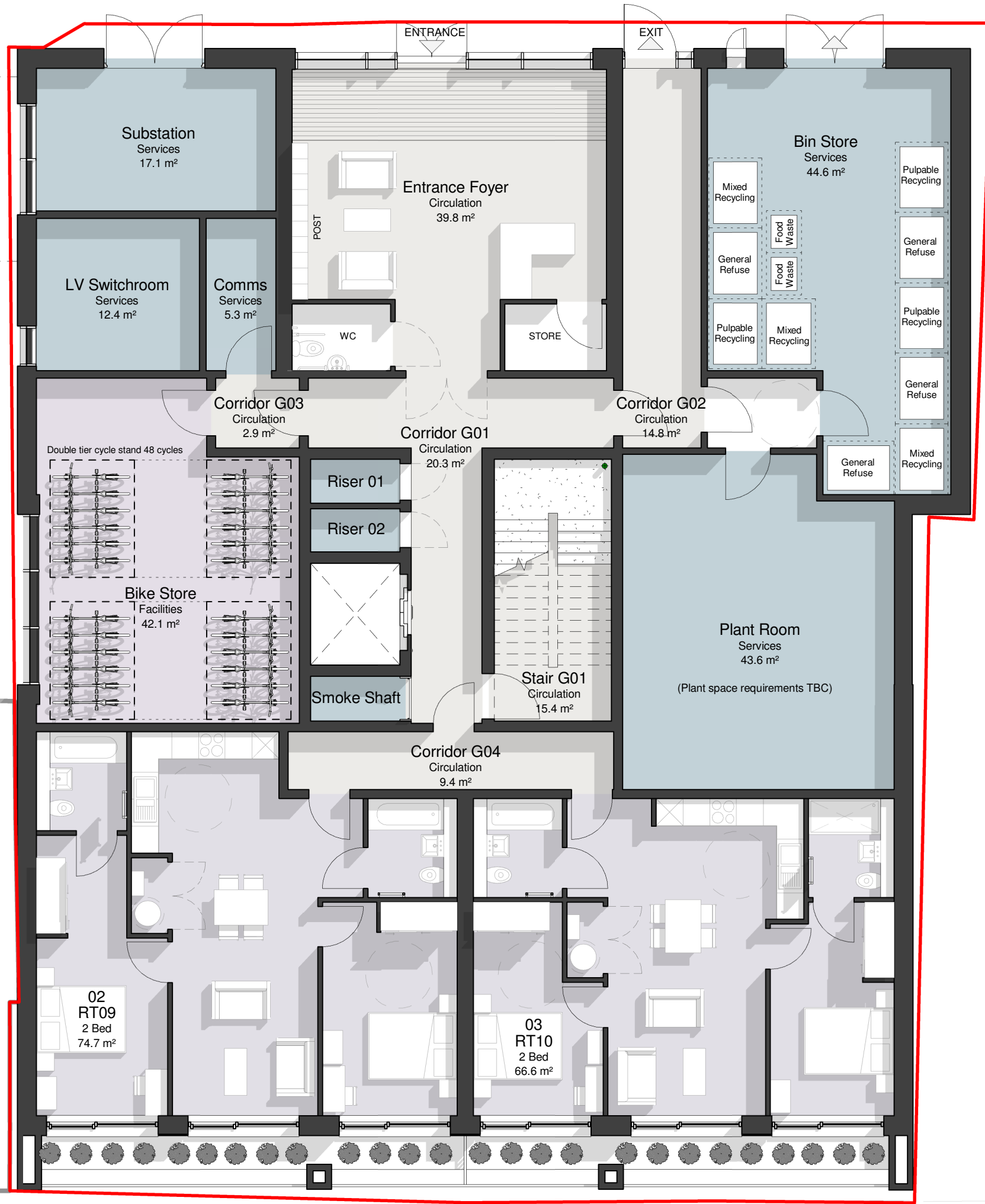
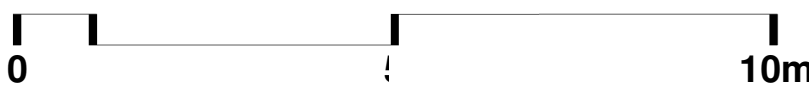
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LOMAX STREET

DUCIE STREET

GA_Level 0
1 : 100





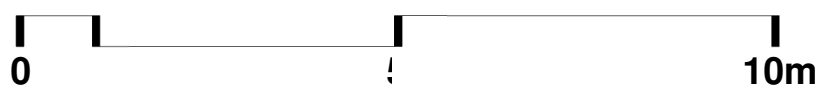
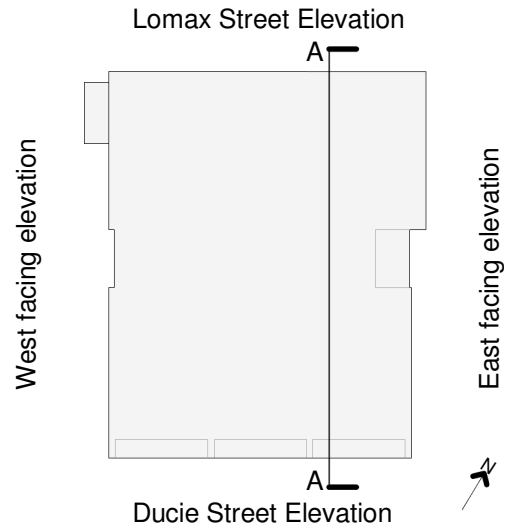
Ducie Street Elevation
1 : 100

Elevation Key

1. Powder coated Aluminium profile cap to be a RAL 1035 Metallic colour or similar approved by Architect and Planner. Built wall sample required for sign off by Client and Architect
2. Main elevations. Brick buff/grey 65mm. 5mm bucket handle joints, mortar to be natural in colour to slightly contrast with brick.
3. Recess brickwork details, 20mm recess from outer brick facade. 5mm bucket handle joints, mortar to be natural in colour to slightly contrast with brick.
4. Powder coated aluminium window frame max. 50mm frames. Sample required for Architect, Planner and Client
5. Powder coated aluminium louvre within door RAL 1035 Metallic colour
6. Aluminium fascia with powder coated or anodised metallic finish to match windows (RAL 1035). 20mm Shadow gap to panel (Width and depth). Panels within brickwork to have a min. recess of 20mm to match the recessed brickwork panels. (All insulation, fixings and finished facade to be non-combustible in accordance to Building Regs Part B Appendix A)Sample panel to be constructed for sign off by LPA, Client and Architect.
- 7.Aluminium capped curtain walling RAL 1035 metallic colour with insulated aluminium spandral panels where shown. Spandral panel facing material to match window frame and cladding colour. All to line in with windows where appropriate.
8. External steel doors RAL 1035 metallic colour, (some with vent/ louvres)
9. Stack bonded soldier course brickwork to match facing brick inc. joints and mortar.
10. Screens to be powder coated RAL 1035 galvanised steel with perforated pattern. Sample panel to be approved by Architect and Client.
11. Powder coated Aluminium RAL 1035 metallic colour to soffit to match window and cladding.
12. Double course stack bonded soldier brickwork detail 5mm bucket handle joints, mortar to be natural in colour to slightly contrast with brick.
13. Angled profile soffit below balconies. Powder coated or anodised aluminium RAL 1035 metallic colour to match windows and cladding panels.
14. Frameless glass balustrade with dsicreet fixings.Frameless glass balustrade with dsicreet fixings.
15. External Galvanised Steel Balustrade with powder coated or anodised metallic finish to match windows. RAL 1035.

- General Note
- All insulation to be non-combustible (Euro Class A1).
 - Gas membrane to be confirmed by civil engineer.
 - All windows and doors to have cavity closers/fire stops.

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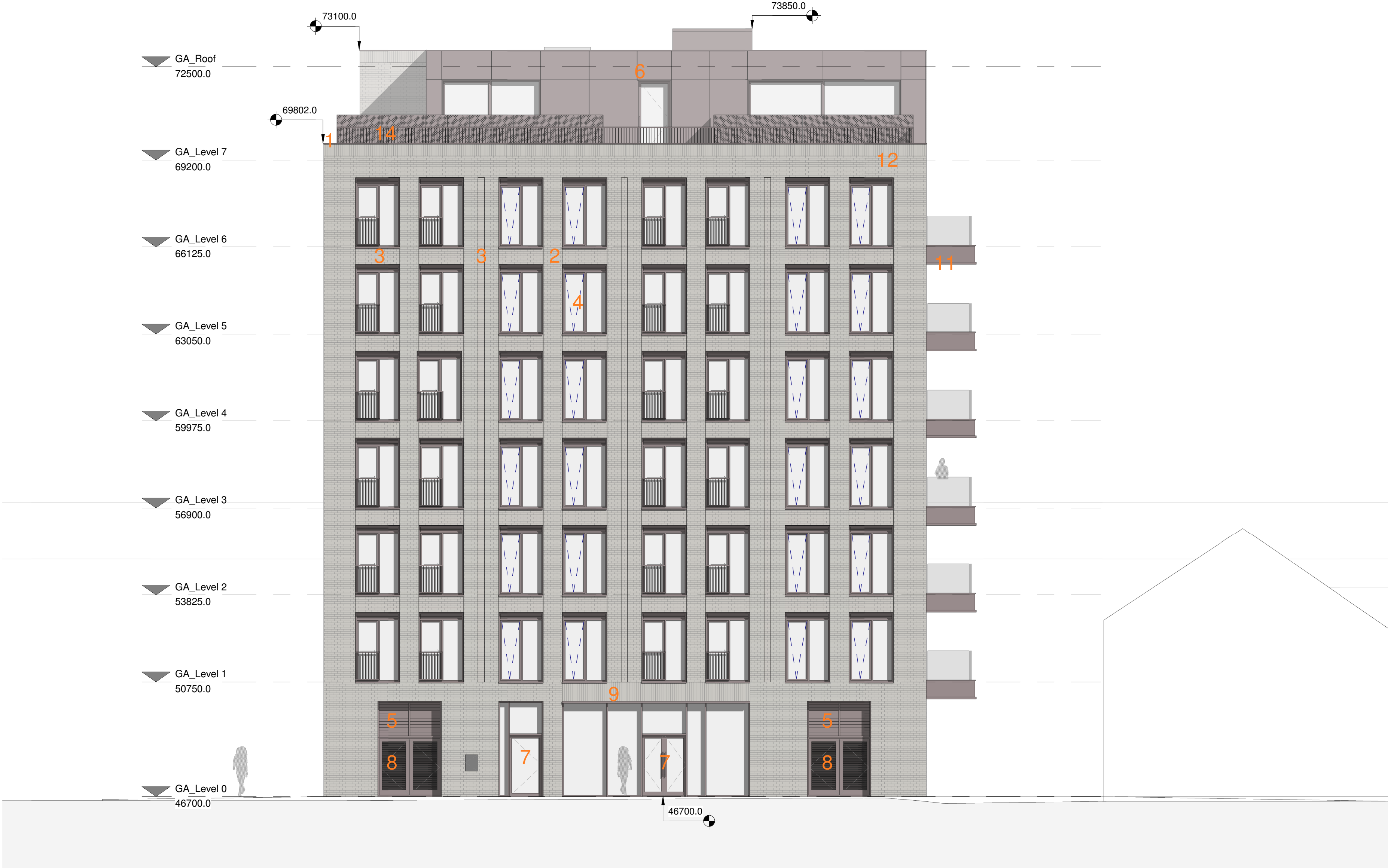
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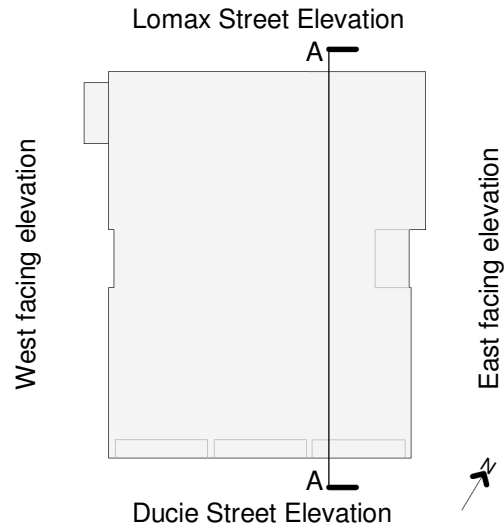
Lomax Street Elevation
1 : 100

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7 Constance Street
Knott Mill
Manchester
M15 4JQ
Tel: +44 (0)161 870 1152
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Air Quality Monitoring Results
Lomax Street, Manchester

Client: Idom Merebrook

Reference: 2278r1

Date: 31st October 2018



Report Issue

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Report Reference: 2278

Field	Report Version			
	1	2	3	4
Prepared by	Olly Hanlon			
Position	Air Quality Consultant			
Issued by	Jethro Redmore			
Position	Director			
Date of Issue	31 st October 2018			
Comments	-			

Heliport Business Park, Liverpool Road, Manchester, M30 7RU

info@red-env.co.uk | 0161 706 0075 | www.red-env.co.uk

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Appendices

Appendix 1 - Monitoring Data

1.0 INTRODUCTION

- 1.1.1 Redmore Environmental Ltd was commissioned by Idom Merebrook to undertake Air Quality Monitoring in order to determine baseline conditions and identify any potential issues at Lomax Street, Manchester.
- 1.1.2 Monitoring of pollutant concentrations was undertaken at two separate locations in the immediate vicinity of Lomax Street and at one location on Oxford Road, Manchester.
- 1.1.3 Monitoring was undertaken for a total period of 3-months and included assessment of the following species at the three separate sampling locations:
- Nitrogen dioxide (NO₂).
- 1.1.4 A summary of the monitoring schedule is provided in Table 1.

Table 1 Monitoring Schedule

Sampling Location	Period	Start Date	Finish Date	Monitoring Parameters
Location 1	1	27/06/2018	27/07/2018	NO ₂
Location 2				
Location 3				
Location 1	2	27/07/2018	30/08/2018	NO ₂
Location 2				
Location 3				
Location 1	3	30/08/2018	27/09/2018	NO ₂
Location 2				
Location 3				

- 1.1.5 Reference should be made to Figure 1 for a map showing the locations of the sampling positions.

2.0 LEGISLATION AND POLICY

2.1 European Directives

2.1.1 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 NO₂, oxides of nitrogen, sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm;
- 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.

2.1.2 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

2.2.1 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 seven pollutants, as well as Target Values for an additional five pollutants. Critical levels for the protection of vegetation were also included for two species.

2.2.2 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 2007¹. 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 exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.2.3 Table 2 presents the AQOs for pollutants considered within this assessment.

Table 2 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum

2.2.4 Table 3 summarises the advice provided in DEFRA guidance² on where the AQOs for pollutants considered within this report apply.

Table 3 Examples of Where the Air Quality Objectives 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

¹ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

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

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
1-hour mean	All locations where the annual mean objective applies. 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

3.0 **METHODOLOGY**

3.1 **Introduction**

3.1.1 Monitoring was undertaken using passive diffusion tube samplers at three separate locations for a total period of 3-months. Installation and maintenance of the diffusion tubes samplers, as well as the selection of the overall monitoring time period was undertaken in accordance with DEFRA guidance³. A summary of the sampling methodology is provided in the following Sections.

3.2 **Monitoring Locations**

3.2.1 The monitoring positions were selected following consultation with MCC and a baseline review of the local road network. A summary of the sampling positions is provided in Table 4.

Table 4 Sampling Locations

Location Number	Approximate National Grid Reference (NGR) (m)		Description
	X	Y	
1	385012	398260	Roadside - Lomax Street
2	385020	398245	Roadside - Ducie Street
3	384233	397287	Roadside - Co-located with Oxford Road continuous analyser

3.2.2 Reference should be made to Figure 1 for a map showing the locations of the sampling positions.

3.3 **Diffusion Tubes**

3.3.1 Monitoring was undertaken in triplicate at each location using passive diffusion tubes. The samplers contain a reagent which absorbs the pollutants of interest at a known rate and from the period of exposure and subsequent analysis an ambient pollutant concentration

³ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

can be calculated. For the purpose of this monitoring survey a preparation of 20% triethanolamine (TEA) in water was utilised.

- 3.3.2 Diffusion tubes provide a time weighted average concentration over the exposure period. They are extensively used by Local Authorities and are recommended in Environment Agency (EA) Technical Guidance Note (TGN) M8⁴. Diffusion tubes are suitable for carrying out spatial or localised air quality assessments and can provide suitable data for baseline pollutant analysis.
- 3.3.3 The samplers were supplied and analysed by Gradko International, a UKAS accredited contract laboratory. Concentrations of NO₂ absorbed by the tubes were determined using ultra violet / visible spectrophotometry with reference to calibration curves derived from the analysis of standard solutions using UKAS accredited methods.

3.4 **Sampling Details**

- 3.4.1 The survey was carried out over a period of 3-months commencing 26th June 2018 and utilised approximately 4-week exposure intervals. A summary of the monitoring periods is provided in Table 5.

Table 5 Monitoring Periods

Monitoring Period	Start Date	End Date
1	26/07/2018	27/07/2018
2	27/07/2018	30/08/2018
3	30/08/2018	27/09/2018

3.5 **Calculation of Results**

- 3.5.1 An overall period mean was calculated for each monitoring location based on the average of the triplicate results. Annualisation was then undertaken in order to estimate annual mean NO₂ concentrations and facilitate direct comparison of the measurement

⁴ TGN M8, Monitoring Ambient Air, EA, 2011.

data to the relevant AQO. This process was undertaken in accordance with DEFRA guidance⁵.

- 3.5.2 Annual mean NO₂ concentrations for use in the annualisation process were obtained from background monitoring sites at three different locations within a 50-mile radius of the development. A summary of the monitoring sites selected for use in the assessment is provided in Table 6.

Table 6 Monitoring Sites

Site Name	NGR (m)		Station Type
	X	Y	
Manchester Piccadilly	388351	347895	Urban Background
Salford, Eccles	398030	300871	Urban Background
Wigan Centre	357816	406024	Urban Background

- 3.5.3 The period mean for each monitoring site was calculated for the corresponding monitoring interval at the development site (26th June 2018 to 27th September 2018). The ratio of the 2017 annual mean to the period mean was then calculated and an average derived as the adjustment factor. A summary of the data used to calculate the adjustment factor is provided in Table 7.

Table 7 Annualisation Data

Site Name	NO ₂ Concentration (µg/m ³)		Ratio (A _m /P _m)
	Annual Mean (A _m)	Period Mean (P _m)	
Manchester Piccadilly	35.72	27.17	1.31
Salford Eccles	26.18	20.08	1.30
Wigan Centre	18.43	11.72	1.57
Average (R_a)			1.40

⁵ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

3.5.4 An estimate of the annual mean NO₂ concentrations at the development site monitoring locations was then calculated by multiplying the measured period mean concentration by the adjustment factor.

3.5.5 Diffusion tubes are affected by several sources of interference which can cause under or overestimation of ambient pollutant concentrations. As such, a local Bias Adjustment Factor (BAF) was applied to the annualised results in order to validate the data. This factor was obtained by dividing the 2018 period mean concentration recorded at the Oxford Road continuous analyser by the equivalent mean concentration measured at this position over the same interval using the co-located diffusion tube samplers.

4.0 MONITORING RESULTS

4.1 Introduction

4.1.1 The results of the monitoring are summarised in the following Sections. Reference should be made to Appendix 1 for full details of the sampling data.

4.2 Unadjusted Monitoring Results

4.2.1 A summary of the unadjusted monitoring results is provided in Table 8.

Table 8 Unadjusted Monitoring Results

Location Number	Tube ID	NO ₂ Concentration (µg/m ³)			
		26/07/18 - 27/07/18	27/07/18 - 30/08/18	30/08/18 - 29/09/18	Overall Period Mean
1	1A	28.60	29.02	36.29	31.57
	1B	30.01	29.17	37.81	
	1C	28.30	28.18	36.76	
	Mean	28.97	28.79	36.95	
2	2A	35.90	30.13	39.16	35.15
	2B	34.50	31.89	41.17	
	2C	34.48	29.66	39.49	
	Mean	34.96	30.56	39.94	
3	3A	56.77	50.73	63.35	57.42
	3B	58.73	56.32	61.07	
	3C	60.55	51.89	57.36	
	Mean	58.68	52.98	60.59	

4.3 Calculation of Bias Adjustment Factor

4.3.1 A triplicate co-location study was undertaken at the Oxford Road continuous analyser to allow a local BAF to be derived in order to account for under or over estimation of the monitored pollutant concentrations.

4.3.2 The BAF was obtained by dividing the 2018 period mean concentration recorded at the Oxford Road continuous analyser by the equivalent mean concentration measured at this position over the same interval using the co-located diffusion tube samplers. A summary of the data used to calculate the BAF is provided in Table 9.

Table 9 Bias Adjustment Factor

NO ₂ Concentration (µg/m ³)		BAF
Period Mean - Oxford Road Continuous Analyser	Period Mean - Co-location diffusion tube samplers	
49.07	57.42	0.85

4.3.3 As indicated in Table 9, a BAF of 0.85 was derived from the results of the co-location study. This was applied to the annualised monitoring results to correct the monitored values at each sample location.

4.4 Adjusted Monitoring Results

4.4.1 A summary of the adjusted monitoring results is provided in Table 10.

Table 10 Adjusted Monitoring Results

Location Number	Period Mean NO ₂ Concentration (µg/m ³)	Annualised NO ₂ Concentration (µg/m ³)	Bias Adjusted NO ₂ Concentration (µg/m ³)
1	31.57	44.10	37.69
2	35.15	49.10	41.97

4.4.2 As shown in Table 10, the adjusted results indicate that concentrations of NO₂ were below the annual mean AQO at Location 1 and above at Location 2.

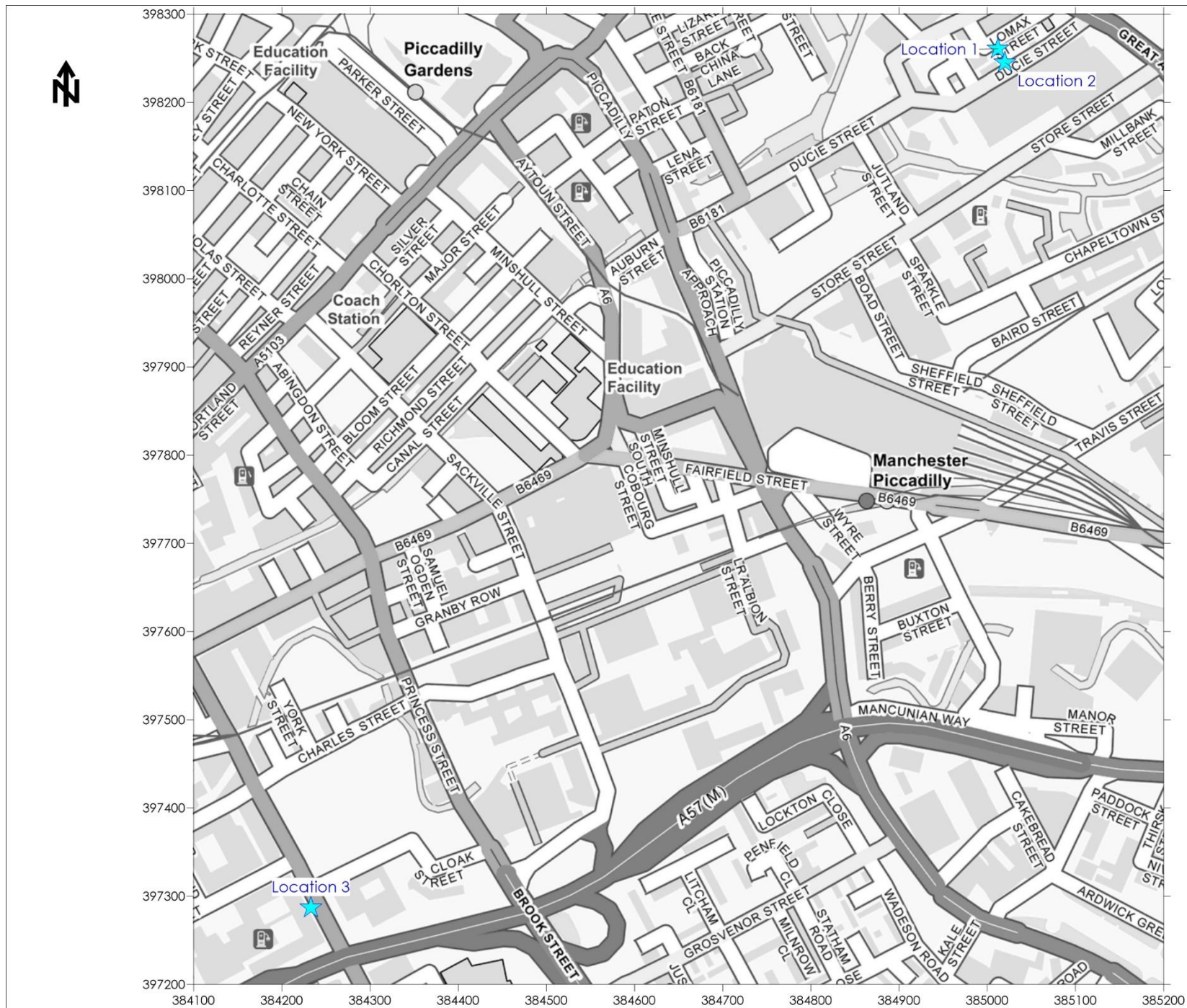
5.0 CONCLUSION

- 5.1.1 Redmore Environmental Ltd was commissioned by Idom Merebrook to undertake Air Quality Monitoring in order to determine baseline conditions and identify any potential issues at Lomax Street, Manchester.
- 5.1.2 Monitoring of pollutant concentrations was undertaken at two separate locations in the vicinity of Lomax Street and at one location on Oxford Road, Manchester. Monitoring was undertaken at each location using passive diffusion tubes over a 3-month period.
- 5.1.3 Monitoring results were annualised and bias adjusted in order to estimate annual mean NO₂ concentrations at the survey locations and facilitate direct comparison of the measurement data to the relevant AQO.
- 5.1.4 The results of the survey and subsequent data analysis indicated that predicted annual mean NO₂ concentrations were below the relevant AQO at Location 1 and above at Location 2.

6.0 **ABBREVIATIONS**

AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
BAF	Bias Adjustment Factor
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EU	European Union
LAQM	Local Air Quality Management
MCC	Manchester City Council
NGR	National Grid Reference
NO ₂	Nitrogen dioxide

Figures



Legend

 Monitoring Location

Title

Figure 1 - Monitoring Locations

Project

Air Quality Monitoring Results
Lomax Street, Manchester

Project Reference

2278

Client

Idom Merebrook

Contains Ordnance Survey Data
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Appendix 1 - Monitoring Data

Monitoring Period 1						
Location	Sample Reference	Monitoring Parameter	Start Date	End Date	Exposure Time (hr)	Concentration ($\mu\text{g}/\text{m}^3$)
1	1A	NO ₂	27/06/2018	27/07/2018	716.23	28.60
	1B	NO ₂	27/06/2018	27/07/2018	716.23	30.01
	1C	NO ₂	27/06/2018	27/07/2018	716.23	28.30
2	2A	NO ₂	27/06/2018	27/07/2018	716.25	35.90
	2B	NO ₂	27/06/2018	27/07/2018	716.25	34.50
	2C	NO ₂	27/06/2018	27/07/2018	716.25	34.48
3	3A	NO ₂	27/06/2018	27/07/2018	716.20	56.77
	3B	NO ₂	27/06/2018	27/07/2018	716.20	58.73
	3C	NO ₂	27/06/2018	27/07/2018	716.20	60.55

Monitoring Period 2						
Location	Sample Reference	Monitoring Parameter	Start Date	End Date	Exposure Time (hr)	Concentration ($\mu\text{g}/\text{m}^3$)
1	1A	NO ₂	27/07/2018	30/08/2018	816.43	29.02
	1B	NO ₂	27/07/2018	30/08/2018	816.43	29.17
	1C	NO ₂	27/07/2018	30/08/2018	816.43	28.18
2	2A	NO ₂	27/07/2018	30/08/2018	816.42	30.13
	2B	NO ₂	27/07/2018	30/08/2018	816.42	31.89
	2C	NO ₂	27/07/2018	30/08/2018	816.42	29.66
3	3A	NO ₂	27/07/2018	30/08/2018	816.42	50.73
	3B	NO ₂	27/07/2018	30/08/2018	816.42	56.32
	3C	NO ₂	27/07/2018	30/08/2018	816.42	51.89

Monitoring Period 3						
Location	Sample Reference	Monitoring Parameter	Start Date	End Date	Exposure Time (hr)	Concentration ($\mu\text{g}/\text{m}^3$)
1	1A	NO ₂	30/08/2018	27/09/2018	671.43	36.29
	1B	NO ₂	30/08/2018	27/09/2018	671.43	37.81
	1C	NO ₂	30/08/2018	27/09/2018	671.43	36.76
2	2A	NO ₂	30/08/2018	27/09/2018	671.38	39.16
	2B	NO ₂	30/08/2018	27/09/2018	671.38	41.17
	2C	NO ₂	30/08/2018	27/09/2018	671.38	39.49
3	3A	NO ₂	30/08/2018	27/09/2018	671.38	63.35
	3B	NO ₂	30/08/2018	27/09/2018	671.38	61.07
	3C	NO ₂	30/08/2018	27/09/2018	671.38	57.36