

SHARPS REDMORE

ACOUSTIC CONSULTANTS ▪ Established 1990



Report

12 Forbury Road, Reading

Replacement external
mechanical services plant –
proposed target sound levels

Prepared by

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1.0 Introduction

- 1.1 Sharps Redmore has been appointed by Cudd Bentley Consulting Ltd to undertake a sound level assessment with respect to the replacement of external mechanical services plant at 12 Forbury Road in Reading.
- 1.2 12 Forbury Road comprises a 5 storey building occupied for commercial/office use. The building is currently subject to a refurbishment program to update the building both externally and internally. The project would also provide additional office space at the fifth floor that currently comprises a tank/plant room, flat roof areas and external mechanical services plant items.
- 1.3 To accommodate the provision of the additional office space at fifth floor, the existing external mechanical services plant serving the building would be removed, and replacement plant would be installed within a screened plant area at roof level above. Drawings of the existing building elevations, fifth floor and roof are provided in Appendix A with drawings of the proposed fifth floor, roof and building elevations showing the relocated external plant and screening.
- 1.4 Given that the building use overall will remain unchanged, the replacement mechanical services plant are expected to be similar to those removed and perform the same functions. It is understood that a planning application is required to make the necessary changes to the building.
- 1.5 The development site is located in central Reading and almost all the surrounding buildings are also commercial/office buildings. The majority of these buildings have roof-mounted mechanical services plant. There is a single building which fronts onto Valpy Street has been identified as having residential use to the upper floors. This building is not however as tall as 12 Forbury Road. The rear elevation of this building and the rear elevation of 12 Forbury Road are opposite each other across a courtyard area. An aerial site location plan indicating the development site and its relationship to neighbouring buildings is shown as Appendix B to this report.
- 1.6 A long-term sound measurement survey has been undertaken at the development site and the results are detailed in Section 3. This report will consider the proposed location of the replacement mechanical services plant, and identify appropriate target sound levels to be achieved by the final plant selection with respect to receptor locations.
- 1.7 This report is supplied to Cudd Bentley Consulting Ltd to accompany a planning application to the local planning authority.

2.0 Replacement mechanical services plant sound level criteria

National Noise Policy

- 2.1 The National Planning Policy Framework (NPPF), March 2012, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 123 of the NPPF states the following:

"Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

- 2.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in Table 2.2 overleaf:

Table 2.2: Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, “Noise Policy Statement for England” (NPSE), which states three policy aims, as follows:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

- 2.4 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

- 2.5 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise from a development one must consider the significance of any impact.

Changes in Sound Level

- 2.6 Changes in noise levels of less than 3 dBA are not perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in sound levels in the index L_{AeqT} .

- 2.7 Table 2.7 below shows the response to changes in sound level (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

Table 2.7: Change in noise level

Change in sound level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

- 2.8 Where the existing ambient noise level is already above the criteria developed from the various guidance documents, it may be considered unreasonable to adopt such criteria. It would be reasonable, however, given the above statement, to consider criteria which do not exceed the existing noise climate, thus giving rise to an overall 3 dB increase i.e. the minimum perceptible. If it is less than the minimum perceptible it cannot be described as disturbing or to affect the amenity of residents.

- 2.9 With respect to the proposed development, the building is already served by mechanical services plant for heating and cooling of the existing offices. It is considered therefore that provided that the sound level emissions from the replacement plant items do not exceed the sound emissions from existing plant items, there would be no change in sound level at receptor locations. The proposed development would therefore represent no impact to office or receptors compared to the existing situation.

3.0 Environmental sound survey

- 3.1 Sharps Redmore were not able to access receptor locations in the near vicinity of 12 Forbury Road to undertake an environmental sound survey. Access was however possible to the external area at current fifth floor/roof level of the development site.
- 3.2 The measurement location was dictated to an extent by positions that could safely be accessed. It was not possible to measure at the rear (southern) building edge closest to the office and residential receptors. The nearest safe position to these closest receptors was therefore adopted. The position was close to the centre of the existing external mechanical services plant items which were running at the start of the survey and believed to have operated throughout.
- 3.3 The following photograph shows the microphone position and facing south. The building opposite (centre left) is an office complex. The Valpy Street residential dwellings are out of view below the level of the roof edge.



- 3.4 A Norsonic 140 Type 1 precision sound level meter was set up with the microphone mounted on a 2m pole in free-field conditions. The sound level meter was field calibrated before and after the survey and no significant measurement drift noted. The meter was set up to make continuous measurements in 15 minute periods and to record parameters including $L_{Aeq,T}$, L_{A90} , and octave band data.
- 3.5 The survey took place between Tuesday 24th and Thursday 26th April 2018. At the time the survey equipment was set up, weather conditions were dry, with a temperature of approximately 14°C and a gentle breeze from a South to South-Westerly direction, and occasional stronger gusts. There was 100% cloud cover. The equipment was collected on Thursday 26th April when it was dry and sunny with a similar temperature. On-line weather data suggests some rain during the period of the survey and some stronger gusts of wind. Examination of the measurement data however does not indicate that the measurement results were unduly influenced.

- 3.6 At the measurement location, the dominant sound sources were the existing external mechanical service plant items serving the offices occupied within the building. Road traffic on Forbury Road was also audible.
- 3.7 The full data from the environmental sound survey are provided in graphical form as Appendix C to this report. The shape of the graph indicates that both the existing ambient ($L_{Aeq,T}$) and background ($L_{A90,T}$) sound levels were dominated by the existing plant. The sound levels remained reasonably constant during both daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) periods.
- 3.8 The octave band data for the existing plant measurements has been observed and no significant uplift in any octave band between 8Hz and 16KHz was noted.
- 3.9 The overall daytime and night-time sound levels measured are summarised as follows:
- Night 1 – $L_{Aeq,8hour} = 67$ dB
 - Day – $L_{Aeq,16hour} = 67$ dB
 - Night 2 – $L_{Aeq,8hour} = 66$ dB

4.0 Proposed replacement mechanical services plant sound limits

- 4.1 The proposed development will require the removal of the existing mechanical services plant at the current roof level (as seen in part in the photograph in Section 3 of this report). The additional office space will be built out at the fifth floor, with the existing tank room remaining. The replacement external plant items would then be located at the roof level above within a screened plant area. The proposals are illustrated by the drawings in Appendix A.
- 4.2 The proposed new plant items will all be at high level and within screens which will remove line of sight from the residential receptors, and the majority of nearby commercial/office receptors.
- 4.3 The proposed layout of the replacement plant items represents an improvement compared to the existing set up as sources will be further from the residential units, and air intakes and outlets orientated away from the residential building.
- 4.4 The final proposed plant selection when operating should have a sound level at or below that measured from the existing plant.
- 4.5 Based on the environmental sound survey described in Section 3, the proposed new plant when operating should be designed so as to not exceed a sound level $L_{Aeq,T}$ of 67 dB during day or night-time periods. The assessment position being on the receptor side of the proposed plant screen, as close to the southern elevation of 12 Forbury Road as is safe to access.
- 4.6 Should the manufacturer's data sheets for the replacement plant indicate any tonality in the source spectrum, a lower overall target sound level may be appropriate.

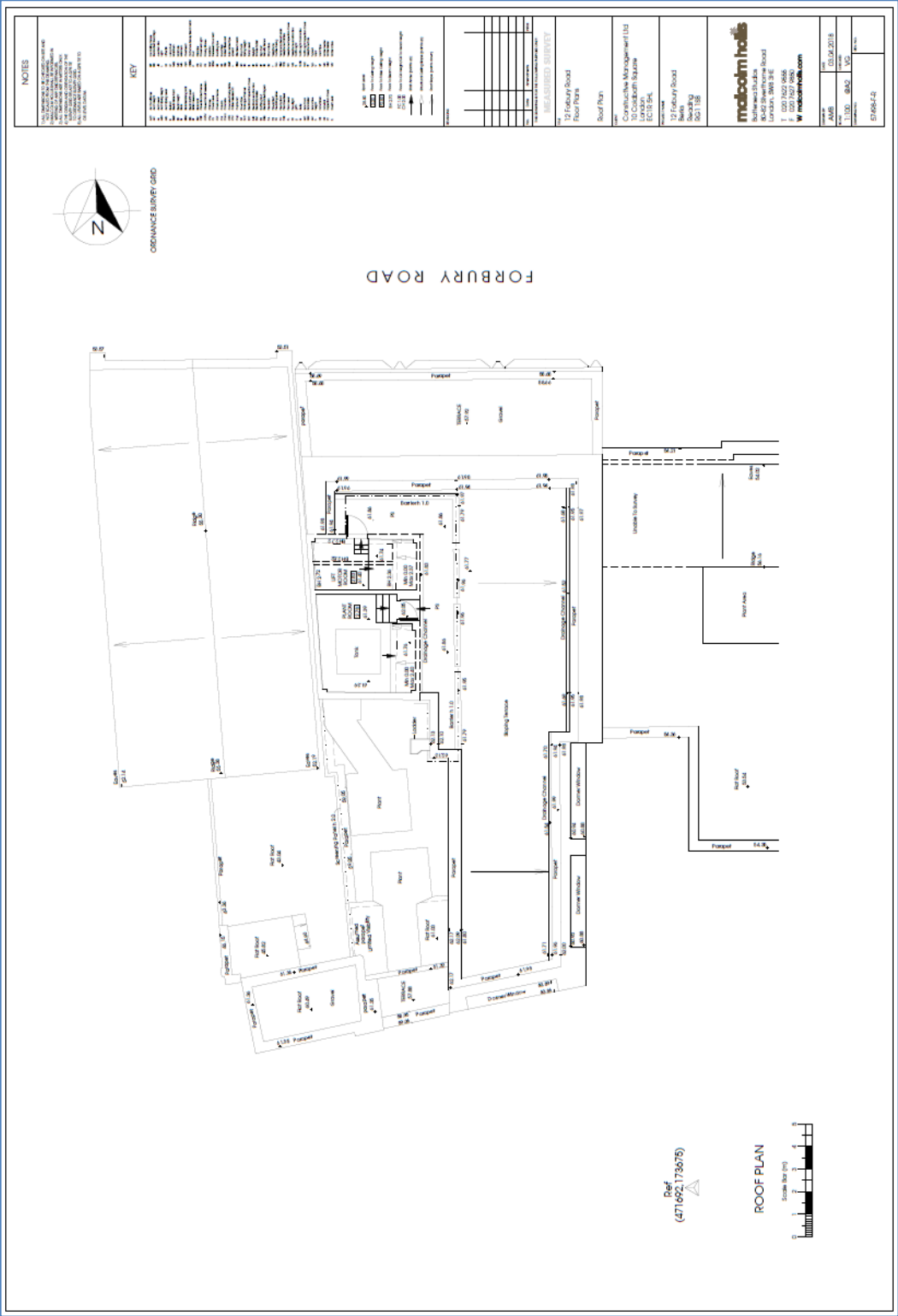
5.0 Conclusions

- 5.1 An environmental sound survey has been carried out at the development site to establish the existing ambient and background sound levels from the existing mechanical services plant.
- 5.2 It is considered that the appropriate sound level limit for the replacement external mechanical service plant items (cumulatively) should be equal to, or below the sound level measured from the existing plant items and detailed in this report.
- 5.3 The proposed replacement plant will be located higher, and therefore further from the nearest residential dwellings identified. These plant items are also proposed such that the sources are further from the residential building and the air intake and outlets are orientated away from the same building.
- 5.4 The proposed replacement plant will also be located within a screened area that is anticipated to further reduce sound emissions to receptor locations.
- 5.5 It is considered that the proposed replacement plant items can be installed and operated to achieve the target sound level described. No impact from sound emissions would then result at receptor locations, and the National Planning Policy Framework aims would be achieved.

APPENDIX A

EXTERNAL PLANT LOCATION AND BUILDING ELEVATION DRAWINGS

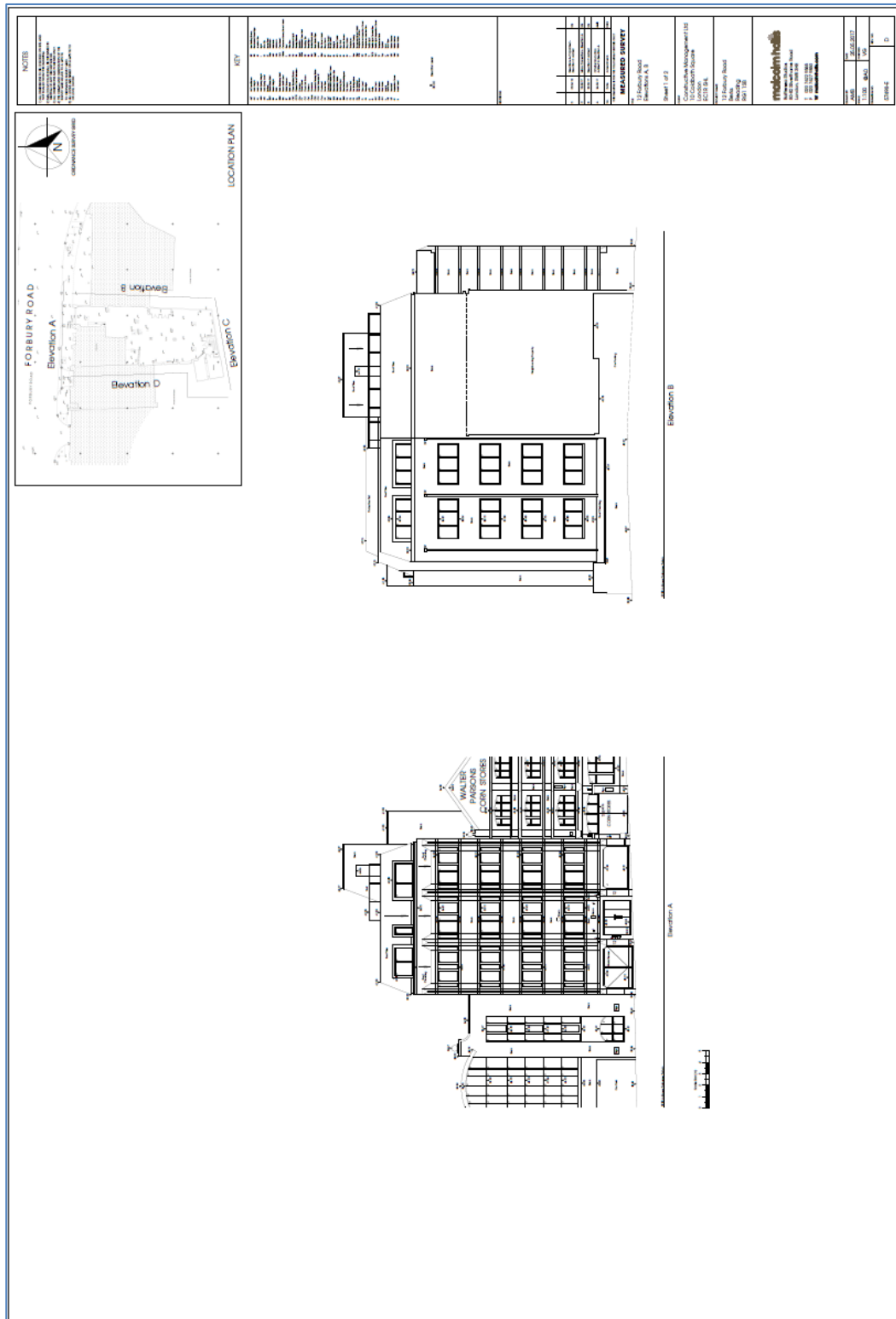
Figure A1 – Existing roof plan



01 | PROPOSED FIFTH
Scale 1:50 | PLAN

[illegible]

Figure A4 – Existing building elevations



01 PROPOSED FRONT
Scale: 1/8" = 1'-0"

02 PROPOSED REAR
Scale: 1/8" = 1'-0"

03 PROPOSED SIDE
Scale: 1/8" = 1'-0"

04 PROPOSED SIDE
Scale: 1/8" = 1'-0"

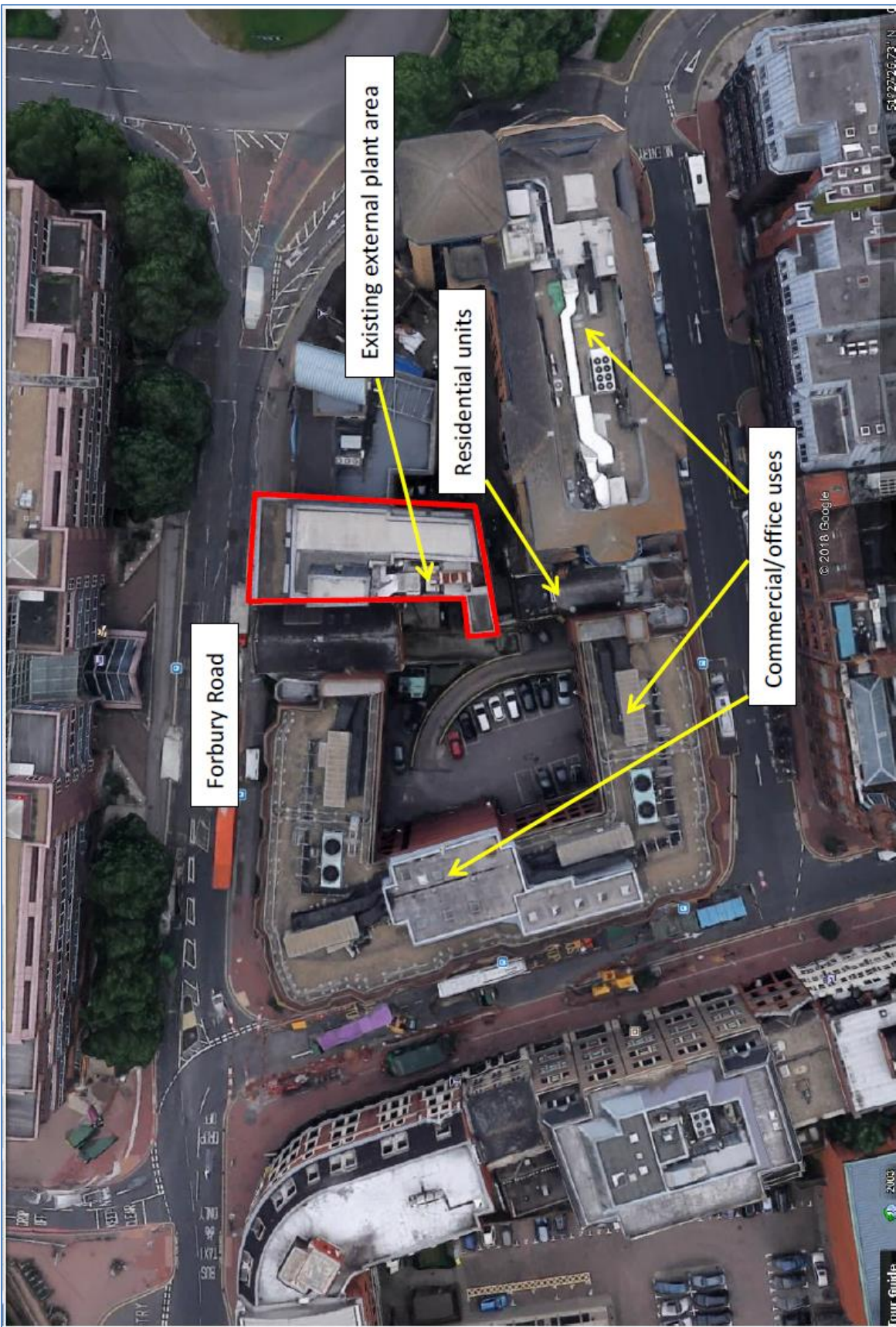
Proposed plant screen
Proposed new extended maintenance safety walk
Existing wall extended
Proposed 14' height windows
Proposed 14' height windows
Proposed plant screen
Proposed 14' height windows
Proposed plant screen

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APPENDIX B

AERIAL SITE LOCATION PLAN



APPENDIX C

ENVIRONMENTAL SOUND SURVEY MEASUREMENT RESULTS

Rooftop sound survey measurement results (free-field) at 12 Forbury

Road, Reading 24-26 April 2018

