44a Gloucester Avenue

Environmental Noise Survey and Plant Noise Assessment Report

22620/PNA2 Rev1

24 January 2020

For: Victoria Square Property Ltd c/o Pears Property 19th Floor 33 Cavendish Square London W1G 0PW



Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595 Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041 (w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk



Environmental Noise Survey Report 22620/PNA2 Rev1

Document Control

Rev	Date	Comment	Prepared by	Authorised by
1	24/01/2020 -	-	No /hall	H
			Nick Russell Principal Consultant MIOA	Andrew Fermer Director BSc(Hons), MIOA

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1.0 Introduction

It is proposed to redevelop 44a Gloucester Avenue to provide a mixed use development with residential and commercial aspects. As part of this redevelopment it is intended to install two external condenser units within a plant store to serve Block E.

The site is subject to noise from the surrounding road and railways. Hann Tucker Associates has therefore been commissioned to undertake a detailed, fully automated noise survey of the site.

This report presents the survey methodology and findings. The survey data may be used as the basis for various acoustic assessment purposes.

2.0 Objectives

To establish, by means of detailed 24 hour daytime and night-time fully automated environmental noise monitoring, the existing A-weighted (dBA) L₉₀, L_{eq} and L_{max} environmental noise levels at selected accessible positions.

To measure octave band spectra noise levels at each measurement position in order to obtain a more detailed description of the noise climate.

Based on the results of the noise survey, and with reference to the requirements of the Local Authority, to recommend suitable plant noise emission criteria.

Based on the results of the noise survey data, to specify the typical worst case incident traffic noise levels for each façade of the proposed development. (These incident noise levels may subsequently be used to carry out detailed calculations in order to determine the acoustic performance requirements of the external building fabric).

3.0 Site Description

3.1 Location

The site is located at 44a Gloucester Avenue and falls within Camden Council's jurisdiction. See Location Map below.



Location Map (Map data @2016 Google)

3.2 Description

The site is bounded by Gloucester Avenue to the south, a railway service yard to the north, three storey residential properties to the west and three storey residential and commercial properties to the east. The areas to the west, east and across Gloucester Avenue to the south are mostly residential use. The area to the north is mostly railway lines which serve Euston Station. The main sources of noise are considered to be traffic on the surrounding roads and trains passing on the lines to the north.



Site Plan (Map data @2016 Google. Imagery @2016 Google)

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 Methodology

The survey was undertaken by Steven Leslie, Senior Consultant, BSc(Hons), MIOA.

5.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 13:30 hours on Thursday 23 March 2016 to 13:30 hours on Friday 24 March 2016.

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were light and the sky was generally overcast. We understand that generally throughout the survey period the weather conditions were calm and cloudy with little rain. These conditions are considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over full 15 minute periods.

5.2 Measurement Positions

The noise level measurements were undertaken at two positions around the development site. The measurement positions are described in the table below.

Position No	Description
1	The meter was located along the site boundary with Gloucester Avenue, at second floor level. The microphone was attached to a pole protruding out from the façade at a height of approximately 10m above ground level. The main source of noise was considered to be traffic on Gloucester Avenue, though some noise was noted from scaffolding works ongoing at the site. The microphone was not considered to be in free field conditions.
2	The meter was located along the site boundary with the railway lines to the north, at first floor level. The microphone was fixed to a pole protruding out from the building façade at a height of approximately 5m above ground level. The main sources of noise at the position were considered to be trains passing and activities within the service yard. The microphone was not considered to be in free field conditions.

The positions were selected in order to assess typical noise levels incident at the building façade for subsequent use in calculating the acoustic requirements of the external building fabric, and also to assess the lowest noise levels at the development site for subsequent use in setting plant noise emission criteria. The positions are shown on the plan below.



Plan Showing Unmanned Measurement Positions (Map data @2016 Google. Imagery @2016 Google.)

5.3 Instrumentation

The instrumentation used during the survey is presented in the table below:

Description	Manufacturer	Туре	Serial Number	Calibration
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3157	LD calibration on 09/03/2015
Position 1 Type 1 ½" Condenser Microphone	Brüel and Kjær	4189	2470594	LD calibration on 09/03/2015
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3803	LD calibration on 10/02/2015
Position 2 Type 1 ½" Condenser Microphone	Brüel and Kjær	4189	2470596	LD calibration on 10/02/2015
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 09/04/2015

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the survey. No significant changes were found to have occurred (no more than 0.1dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

6.0 Results

The results have been plotted on Time History Graphs 22620/TH1.1 to 22620/TH1.2 enclosed presenting the 15 minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

As detailed in our Environmental Noise Survey Report dated 1 April 2016 the noise levels recorded at Position 2 appeared to have been affected by existing plant noise:

"It can be seen from Time History Graph 22620/TH1.2 that existing plant affected the measurements at Position 2. It is not advisable to set plant noise emission criteria based on these elevated levels; to do so would involve a significant risk of possible enforcement by the Local Authority. Criteria should only be based on "true" background noise levels in the absence of building services plant. We would expect typical minimum L_{A90} (15mins) background noise levels in the composite time."

7.0 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the dominant noise sources were noted to be traffic on Gloucester Avenue, scaffolding works being undertaken along the Gloucester Avenue façade, trains passing to the north and activities in the service yard along the northern site boundary.

Noise levels recorded at Position 1 during working hours appear to have been briefly affected by the scaffolding works that were being undertaken at the site, however the effect on the results appear minor. Night time noise levels at the position were very low for a Central London location, it is likely that traffic on Gloucester Avenue during the survey was light.

Noise levels recorded at Position 2 were higher than at Position 1, which is expected due to the presence of the railway lines. The $L_{A90,15 \text{ min}}$ levels were almost constant, suggesting that there were items of building services plant in the vicinity which were in constant operation, (though these were not noted during the site visits).

8.0 Acoustic Standards and Guidelines

8.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010. The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledge in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three aims listed in paragraph (b) above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development."* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding

principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

8.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (revised July 2018):

"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life*;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

Paragraph 180 also references the Noise Policy Statement for England. This document does not refer to specific noise levels but instead sets out three aims:

"Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

8.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at <u>http://planningguidance.planningportal.gov.uk/blog/guidance/</u>. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

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.	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 hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

8.4 Local Authority Requirements

The site lies within London Borough of Camden's jurisdiction. Their advice regarding criteria for atmospheric noise emissions from building service plant is contained within their Local Plan, version June 2017 as follows:

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB' below background and no events exceeding 57dBLAmax	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB LAmax	'Rating level' greater than 5dB above background and/or events exceeding 88dBLAmax

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

On 26 June 2016 London Borough of Camden sent us an email confirming the following windows should be considered noise sensitive, *"housing, schools, hospitals, offices, workshops"*.

8.5 BS 4142:2014

When setting plant noise emission criteria reference is commonly made to BS 4142: 2014 "Methods for rating and assessing industrial and commercial sound".

BS 4142 states that: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:

• "Typically, the greater this difference, the greater the magnitude of the impact."

• "A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."

• "A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."

• "The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

The determination of the "rating level" and the "background level" are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to "No Observed Effect Level" as defined in the Noise Policy Statement for England.

8.6 World Health Organisation Guidelines on Community Noise

BS8233:2014 is based upon the current World Health Organisation (WHO) guidance *"Guidelines on Community Noise".* A summary of the noise guidelines relevant to the proposed scheme is presented in the table below.

Residential Environment	Critical Health Effect(s)	L _{Aeq}	LAFmax	Time Base
Outdoor living	Serious annoyance, daytime and evening	55	-	07:00-23:00
area	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

These WHO guidelines are based, in almost all cases, on the lower threshold below which the occurrence rates of any particular effect can be assumed to be negligible.

8.7 British Standard BS8233: 2014

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings"

provides guidance for the control of noise in and around buildings.

BS8233:2014 Section 7.7.2 titled "Internal ambient noise levels for dwellings" states:

"In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Δοτινιάν	Location	Desirable Interna	I Ambient Criteria
Activity	Location	07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB L _{Aeq,16hour}	-
Dining	Dining Room/Area	40 dB LAeq,16hour	-
Sleeping (Daytime Resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq,8hour

8.8 Statutory Noise Nuisance

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the plant noise level is at least 5dB (or 10dB if tonal) below the minimum background $L_{90(15minutes)}$ at 1m from the nearest noise sensitive window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

8.9 Proposed Plant Noise Emission Criteria

Based on the above guidance and the measured noise levels summarised in Section 6.0, we therefore propose the following plant noise emission criteria to be met at 1m outside the nearest neighbouring residential property.

Plant Noise Emission Criteria (dBA re:2x10 ⁻⁵ Pa)			
Position	Daytime (07:00 – 23:00 hours)	Night Time (23:00 – 07:00 hours)	
1	35 dBA	30 dBA	
2	40 dBA	30 dBA	

If the plant noise has a distinguishable, discrete note and/or distinct impulses, the above criteria must be reduced by 5dB.

9.0 Plant Noise Impact Assessment (BS 4142:2014)

9.1 **Proposed Plant**

We have assessed the potential noise impact of the proposed plant on neighbouring noise sensitive receptors in accordance with the methodology described in BS 4142:2014.

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The details of the proposed plant are as follows:

Description	Manufacturer	Qty	Plant Model	Sound Pressure Level (dBA)	Plant Location
External Condenser	Daikin	2	RXYSCQ5TV1	52 @ 1m	Block E Ground Floor

We understand that the nearest noise sensitive neighbouring window is part of 42 Gloucester Avenue and the window is part of a commercial premises. This window is at a distance of approximately 8 metres from the plant horizontally. It is proposed to install the two condensers within a louvred enclosure on a wall between 44 and 42 Gloucester Avenue. This should provide a significant barrier loss to noise being transmitted in the direction of 42 Gloucester Avenue. We have attached a copy of the 21st Architecture drawing referenced 173_PL07_GA_00_Rev which shows the proposed plant area in relation to Block E and the following sketch details a section through the proposed plant installation:



9.2 Specific Noise Level Assessment

The following table summarises our predictions of the atmospheric plant noise from the condensers to the nearest noise sensitive neighbouring windows which are part of the offices at the western part of 42 Gloucester Avenue.

	Sound Pressure Level (dBA)
Individual Condenser Noise Level	52 @ 1m
2No. Condensers (+3dB)	55 @ 1m
Distance Loss 8m	-10
Barrier Correction from the Intermediate Wall	-18
Façade Reflection	+3
Calculated Noise Level at Receptor	30

NB. We have not considered any acoustic loss through the louvres detailed in Section 9.1 above as we understand that these are aluminium weather louvres and not acoustic louvres. It is likely, however, that a further nominal reduction could be achieved to noise transmitted to atmosphere.

9.3 Plant Noise Impact Assessment

The following table presents our impact assessment of noise from the proposed plant to the nearest noise sensitive window for the daytime period, undertaken in accordance with BS 4142:2014.

Results		Relevant Clause	Commentary	
Specific sound level at receptor	L _{Aeq,1h} = 30dB	7.3.6	See table in Section 9.2 above.	
Background sound level	L _{A90,1h} = 50dB	8.1.1 8.1.3 8.3	The background sound level was measured at the site and was considered to be representative of the typical background sound level.	
Assessment made during the daytime so reference period is 1 hour		7.2		
Acoustic feature correction	+3 dB	9.2	A correction of 3dB has been applied as the plant could be operating intermittently.	
Rating level	33dB	9.2	Calculated by adding acoustic feature corrections to the specific sound level.	
Difference between rating level and background sound level	-17 dB	11	This is comfortably below the requirements of Camden Council.	
Assessment indicates a low impact due to plant noise at the receptor.		11	The rating level does not exceed the background sound level. It is estimated to be 17dB lower than the background sound level.	
Uncertainty of the Assessment	Low	10	The background sound level is based on repeatable measurements made at the site. Some uncertainty exists in the acoustic characteristics of the proposed plant, but as the rating level is significantly below the background level (17dB) this does not have any significance on the outcome of the assessment.	

In summary, our assessment in accordance with BS 4142:2014 indicates a low noise impact as a result of the proposed plant during the daytime.

10.0 Conclusions

A detailed 24 hour daytime and night-time fully automated environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site. This report presents the results of our survey.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the requirements of the Local Authority.

Typical worst case incident traffic noise levels for each façade of the proposed development have been specified based on the results on the noise survey data.

The proposed wall mounted condensers have been assessed and our calculations indicate that these should be capable of achieving the Local Authority noise criteria.

Appendix A

The acoustic terms used in this report are defined as follows:

- dB Decibel Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
- dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

- $L_{90,T}$ L_{90} is the noise level exceeded for 90% of the period T (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
- $L_{eq,T}$ $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.
- L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.
- L_p Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2 x 10⁻⁵ Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
- L_w Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10⁻¹² W).



Date and Time

22620/TH1.1

Date and Time

22620/TH1.2

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Plant room - Area indication - scope of this planning application

For NMA Planning application refer to PP-082664895

	Client Victoria Square Property Company Limited Project 44 Gloucester Avenue London NW1 8JD	Architecture Ltd	Twenty First Architecture Ltd, 314 Goswell Road, London, ECIV 7AF Tel: +44(0)20 7952 0252 www.21starchitecture.com	
	Drawing Title Proposed Floor Plans	Status Information	Drawn TJS	Checked RD
	General Arrangment	Scale 1:100 @ A1, 1:200 @ .	A3	Date April 2016
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