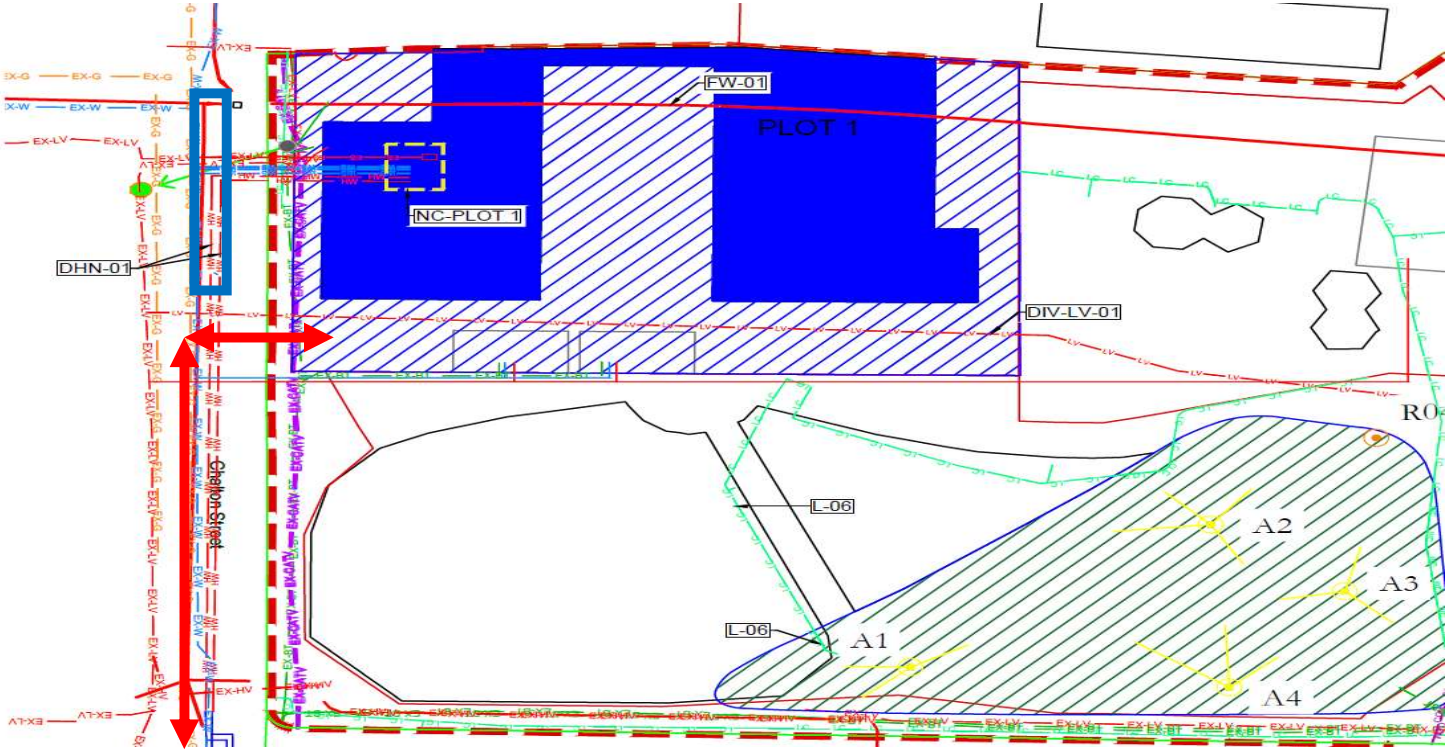
DHN Works Minimal Disruption Phase Plan – Phase 3 (1 week 2 days)

1) NC to remove temporary access and reopen pedestrian footway (< 1 day)
2) NC to access site via (Eversholt Street – Polygon Road – Chalton Street)
3) VITAL ENERGi to continue Northbound on Chalton Street (Phase 3) and complete works

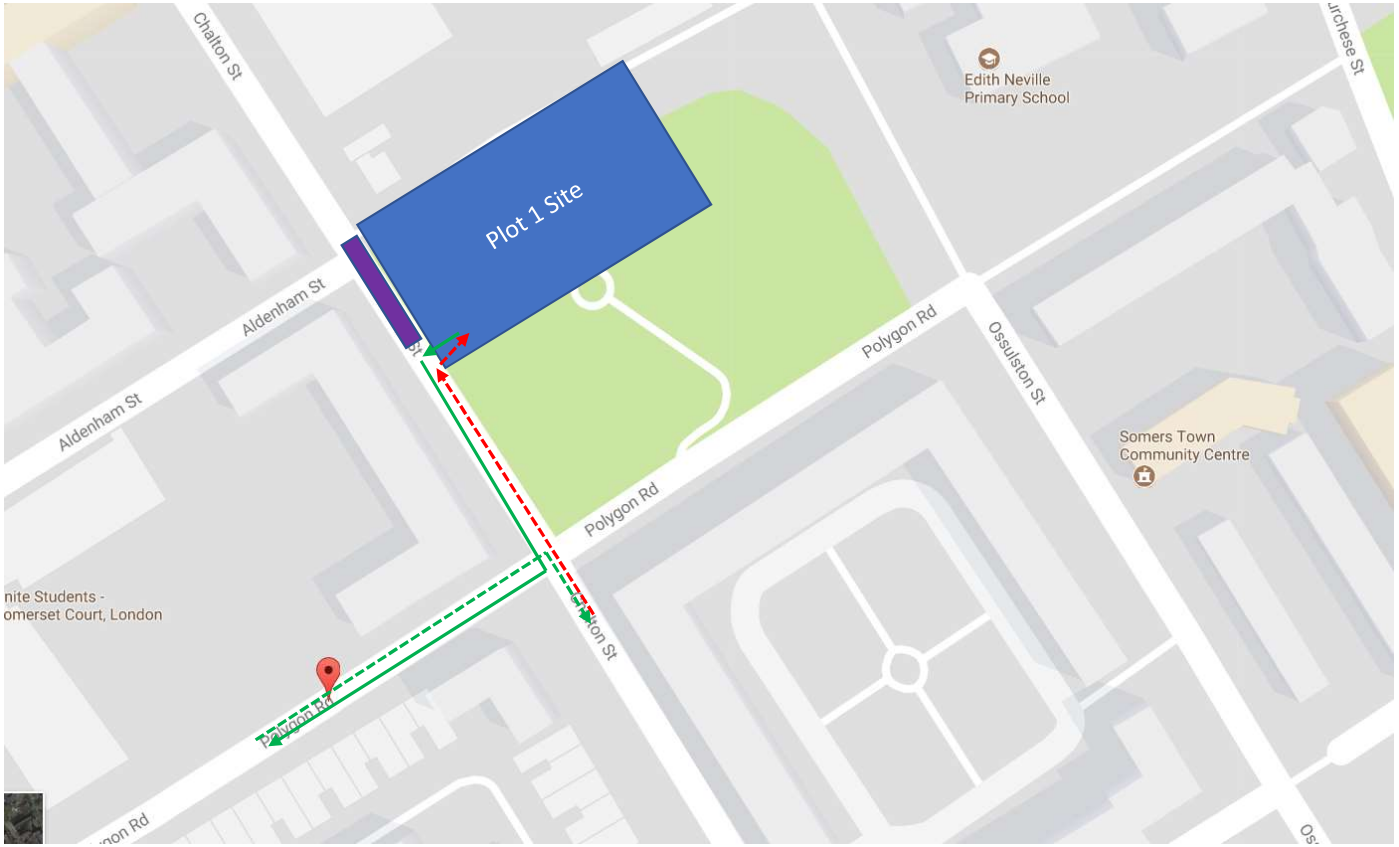


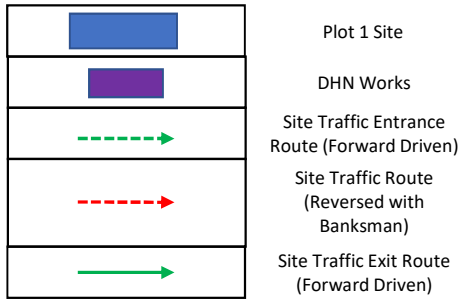
Site Access/Site Traffic Route

VITAL ENERGi DHN Installation Works

DHN Works Minimal Disruption Phase Plan – Phase 3 (1 week 2 days)

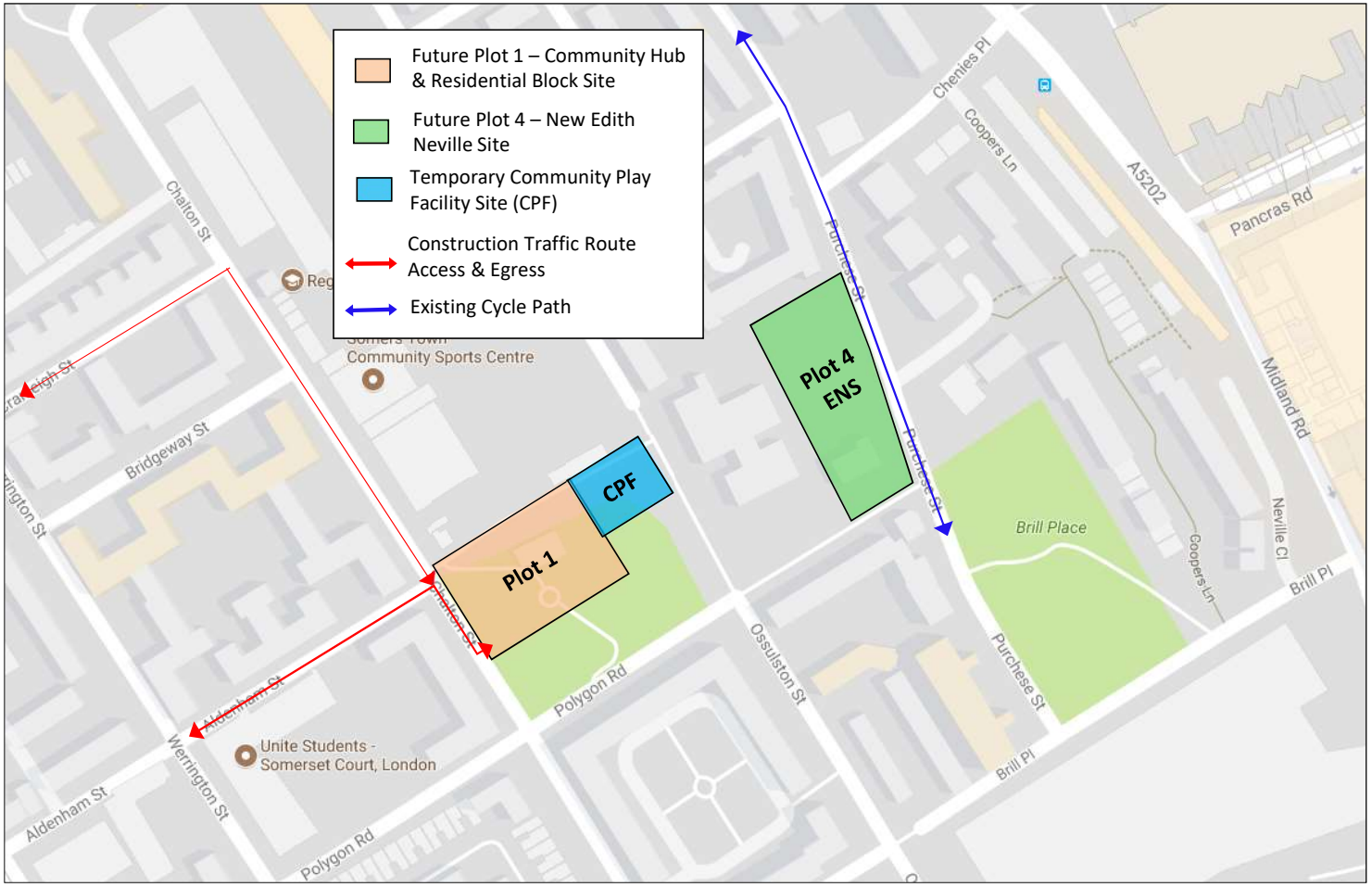
Site traffic routes during phase 3 installations of DHN network



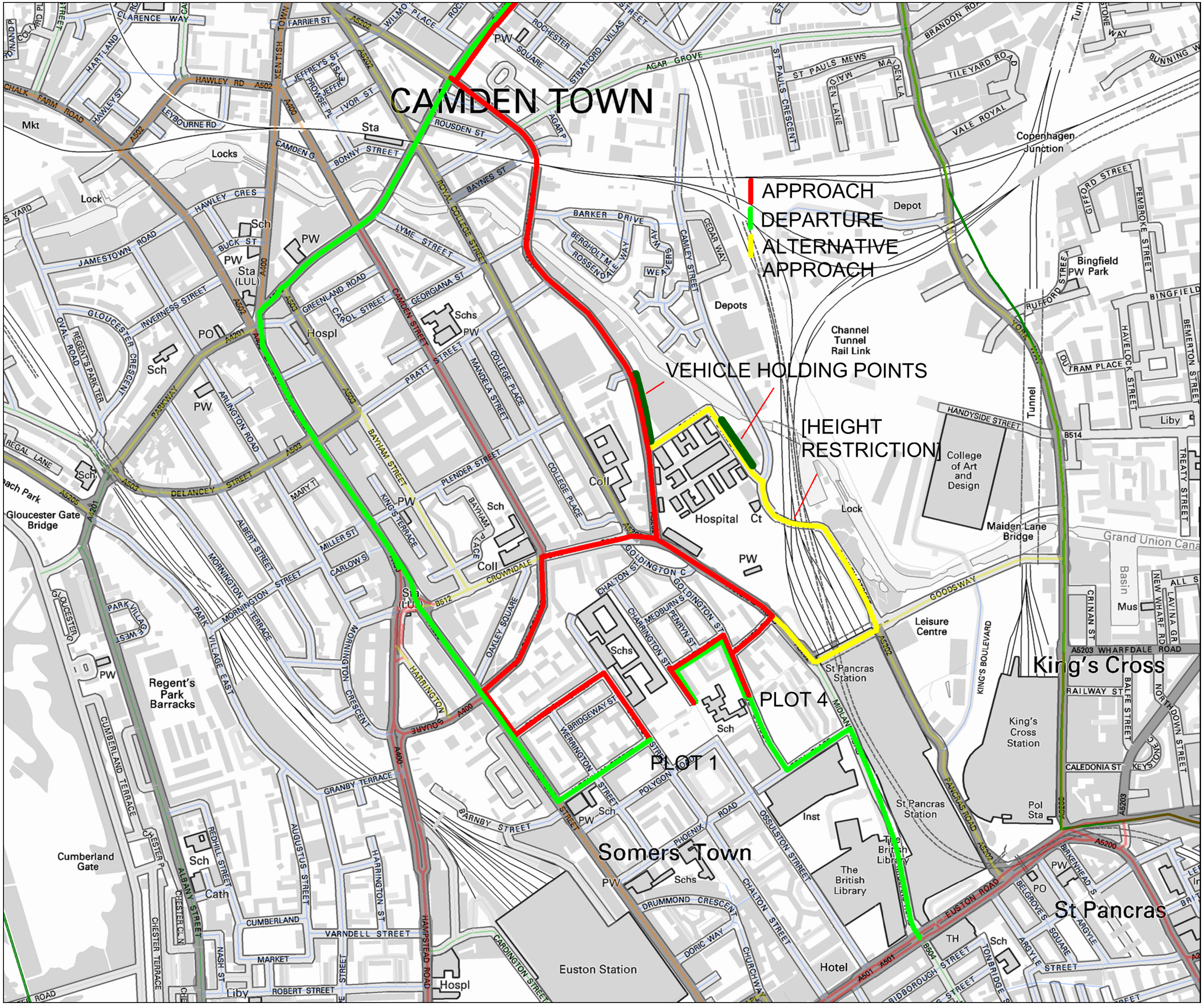


DHN Works Minimal Disruption Phase Plan – Completion of DHN Installation works (Chalton Street)

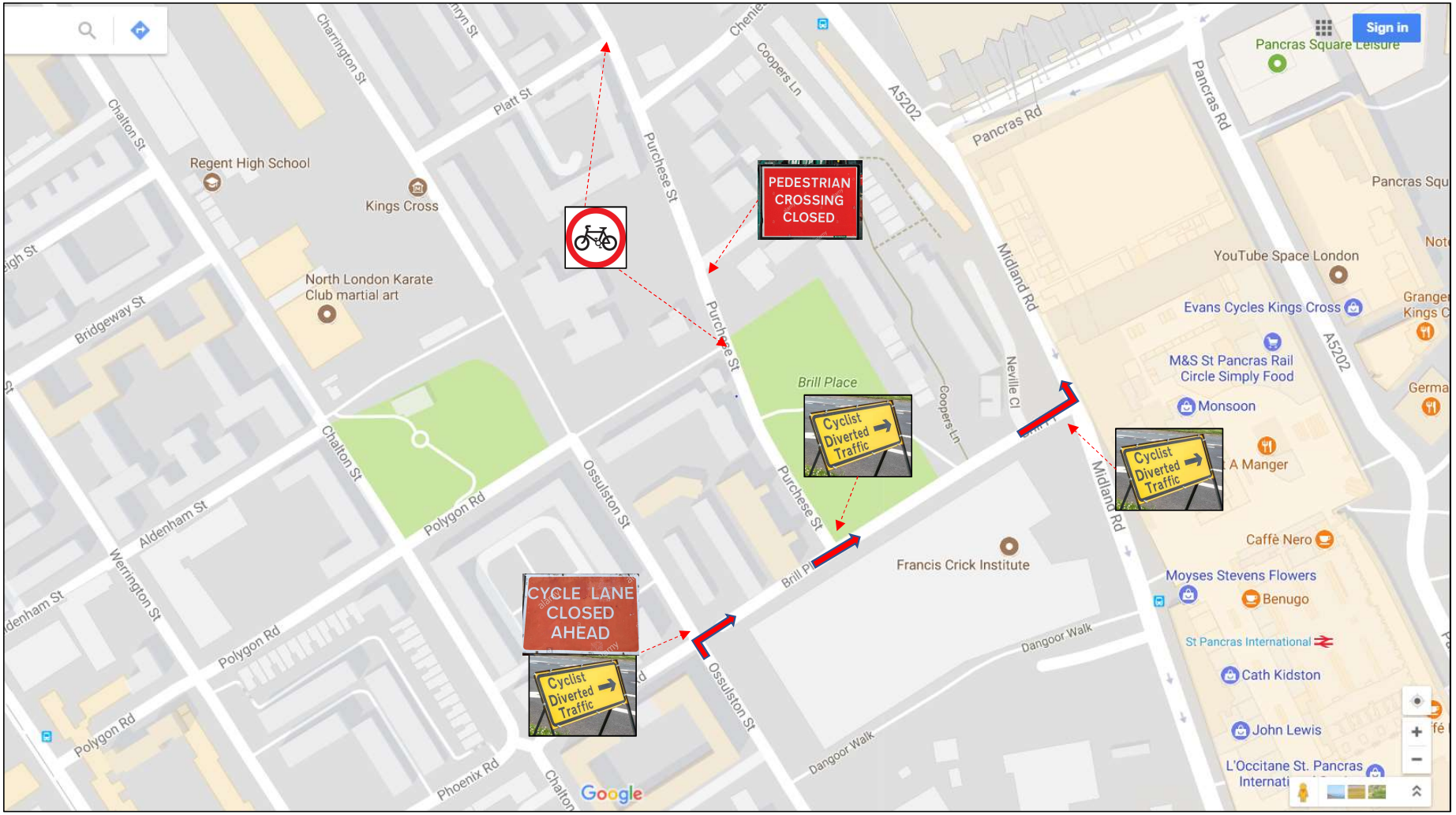
Traffic Routes to revert to original proposed routes via Cranleigh Street and Aldenham Street



APPENDIX N – CST Routes


CAMDEN TOWN
APPROACH
DEPARTURE
ALTERNATIVE APPROACH
VEHICLE HOLDING POINTS
[HEIGHT RESTRICTION]
PLOT 4
PLOT 1
Somers Town
King's Cross
St Pancras
Euston Station
St Pancras Station
King's Cross Station
The British Library
Regent's Park Barracks
Cumberland Gate
Gloucester Gate Bridge
College of Art and Design
Maiden Lane Bridge
Channel Tunnel Rail Link
Copenhagen Junction
Leisure Centre
Hospital
Depots
Grand Union Canal

APPENDIX O – Cycle Route Closure & Diversion Plan


PEDESTRIAN CROSSING CLOSED
CYCLE LANE CLOSED AHEAD
Cyclist Diverted Traffic
Cyclist Diverted Traffic
Cyclist Diverted Traffic
Sign in
Pancras Square Leisure
Regent High School
Kings Cross
North London Karate Club martial art
YouTube Space London
Evans Cycles Kings Cross
M&S St Pancras Rail Circle Simply Food
Monsoon
A Manger
Caffè Nero
Moyses Stevens Flowers
Benugo
St Pancras International
Cath Kidston
John Lewis
Francis Crick Institute
Brill Place
Pancras Rd
Midland Rd
Purchese St
Ossulston St
Dangoor Walk
Polygon Rd
Aldenham St
Bridgeway St
Chalton St
Platt St
Coopers Ln
Neville Cl
A5202
Google

APPENDIX P – BS5228 Rev 2 Somers Town Plot 1 – Demolition and Construction Noise and Vibration Assessment

24Acoustics

Pepper Mill Barn
Old Salisbury Lane
Romsey
SO51 0GD

T: 01794 515999

CENTRAL SOMERS TOWN, CAMDEN
PLOT 1 – CHALTON ST COMMUNITY HUB

DEMOLTION AND CONSTRUCTION
NOISE AND VIBRATION ASSESSMENT

Technical Report: R7069-1 Rev 2

Date: 16th October 2017

For: Neilcott Construction Ltd
Excel House
Cray Avenue
Orpington
Kent
BR5 3ST

24 Acoustics Document Control Sheet

Project Title: Somers Town, Camden – Plot 1 Demolition and Construction Noise and Vibration Assessment

Report Ref: R7069-1 Rev 2

Date: 16th October 2017

	Name	Position	Signature	Date
Prepared by	Neil McLeod BA(Hons) MIOA	Senior Consultant		
Approved by	Stephen Gosling BEng MIOA	Principal Consultant		
For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved for issue	Neil McLeod	Stephen Gosling
1	Approved for issue	Neil McLeod	Stephen Gosling
2	Approved for issue	Neil McLeod	Stephen Gosling

DISCLAIMER

This report was completed by 24 Acoustics Ltd on the basis of a defined programme of work and terms and conditions agreed with the Client. The report has been prepared with all reasonable skill, care and diligence within the terms of the Contract with the Client and taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project.

24 Acoustics Ltd accepts no responsibility whatsoever, following the issue of the report, for any matters arising outside the agreed scope of the works.

This report is issued in confidence to the Client and 24 Acoustics Ltd has no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

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CONTENTS **PAGE**

1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been retained by Neilcott Construction Ltd to undertake an assessment of the potential noise and vibration impact from the demolition and construction works associated with the development Charlton St Community Hub (comprising residential properties and community facilities), Plot 1 of the Central Somers Town Development, Camden.

1.2 This assessment has been undertaken using the site plans and build schedules provided by Neilcott Construction Ltd, relating to the proposed phases of demolition and construction.

1.3 All sound pressure levels quoted in this report are in dB relative to 20 µPa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 CRITERIA

2.1 The development has planning permission and Condition 83 requires the provision of a Construction Management Plan. Camden Council's Minimum Requirements for Building Construction and Demolition Sites (PN11, July 2016) confirms that the following information is required in relation to noise and vibration:

- Confirmation of prevailing ambient noise levels;
- Prediction of actual likely (not worst case) noise and vibration levels throughout the proposed works;
- Arrangements for noise and vibration prevention, suppression and monitoring;
- Action to be taken in case of exceedances

2.2 The document also sets out limiting operational hours for noisy activities and discusses noise abatement techniques and monitoring requirements.

3.0 SITE DESCRIPTION AND PROPOSED WORKS

3.1 Figure 1 provides an aerial image of the site and surroundings and the proposed development.

3.2 The nearest potential receptors likely to be affected by noise and vibration associated with activities on site include St Aloysius Nursery, Edith Neville Primary School and residential properties on:

- Chalton Street to the west;
- Polygon Road to the south;
- Charington Street to the north east;
- Ossulston Street to the south east.

3.3 The development comprises community spaces on the ground floor of Block A and B; four stories of residential properties in Block A and a Multi-Use Games area at first floor level to Block B.

3.4 Excluding enabling works, the demolition and construction works for Block A and B have been divided into three phases with reference to the project's construction programme, as described in Table 1.

Construction Stage	Description	Approximate Duration	Typical Activities
0 Demolition and Site Preparation	Demolition	2 weeks	Demolition
1 CFA Piling and Concrete Structure	Piling	8 weeks	Sheet/CFA Piling, HGV movements, excavators, dumper, roller, generator
	Concrete Structure	40 weeks	HGV movements, excavator, dump truck, concrete pump, mobile crane
2 Cladding, Power and Fit-Out	External Cladding Mechanical and Power	35 weeks	HGV movements, forklift truck, mobile crane, portable generators
	Fit-Out and External Works	22 weeks	HGV movements, dump truck, vibratory roller/ wacker plate

Table 1 - Summary of Construction Phases

3.5 In accordance with Camden Council's requirements, construction working hours will, where practicable, be between 08:00 and 18:00 hours Monday to Friday and 08:00 to 13:00 hours on Saturdays. There will be no works on Sundays or Public Holidays.

3.6 Internal fit out works may take place outside of the standard working hours listed above providing they are not measurable beyond the site boundary, and so as not to disturb local residents.

3.7 There may be occasions when certain activities which are measurable beyond the site boundary need to take place out of hours. This situation will typically only occur if required for safety reasons i.e. the activity would present an unacceptable level of risk to site operatives/public if undertaken during core hours. These instances are expected to be rare and the Contractor will ensure that notification will be provided to Camden and residents ahead of such works.

4.0 CRITERIA

British Standard 5228 Part 1: Noise

4.1 BS 5228 Part 1 [Reference 1] provides guidance on the control of noise from construction and open sites. The standard provides recommendations for basic methods of noise control relating to construction and open sites where work activities/ operations generate significant noise levels. The standard also, in Annex E provides means of assessing the significance of noise effects.

4.2 It is proposed to compare predicted noise levels with an upper threshold of 75 dB $L_{Aeq,\ 10\ hour}$ (Monday to Friday) and 75 dB $L_{Aeq,\ 5\ hour}$ (Saturday), as assessed at the nearest properties.

BS5228 Part 2: Vibration

4.3 Advice on assessing vibration from construction activities is given in BS 5228:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'. The standard provides an empirical method for predicting ground-borne vibration from construction works. Table B.1 of the standard provides guidance on the potential effects of vibration and is reproduced below as Table 2.

Vibration Level	Effect
0.14 mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential developments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Table 2 - Guidance on effects of Vibration Levels

4.4 Subject to good communication with the nursery, school and local residents, an upper trigger value of 1mm/s at or within neighbouring properties is considered appropriate at the nearest properties.

5.0 ENVIRONMENTAL NOISE MEASUREMENTS

5.1 Environmental noise measurements reported by Max Fordham (reference Plot 1 Community Facilities - Noise Impact Assessment Revision E, December 2015) describe the prevailing daytime ambient noise levels as follows:

- Centre of the development site 54 dB $L_{Aeq,16\ hour}$;
- Chalton Street 54 dB $L_{Aeq,1\ hour}$;

5.2 The report concludes that the above levels are representative of conditions at the properties nearest to the development site and are consistent with those expected by 24 Acoustics.

6.0 CALCULATIONS AND ASSESSMENT

6.1 24 Acoustics has liaised with the project engineering team to establish the likely duration and dates of the works together with the likely plant to be used during the works. This information has been used to undertake predictions of likely noise levels from the works at the nearest residential properties;

6.2 An assessment of the likely noise impact has been undertaken in accordance with the guidance of BS 5228 and noise levels from construction activities have been calculated at a number of differing distances to quantify the likely range of noise levels to which the receptors could be exposed.

Noise Assessment

6.3 Calculations of the potential noise levels generated by the demolition and construction works have been carried out using the guidance of BS 5228. The level of noise generated by the infrastructure construction activities will depend upon a range of factors, which include plant to be used, distance between source and receptor and % on-time for each item of plant.

6.4 Calculations have been undertaken for each of the identified phases and for the typical and minimum distance between each work site and the nearest receptors. Precise details relating to the construction methodology are not available so reasonable assumptions have been made with reference to the demolition and construction contractors' management plans.

6.5 Source-term noise data for the plant has been taken from the database contained in BS 5228 and also from measurements of similar plant previously undertaken by 24 Acoustics.

6.6 Example calculations are provided in Appendix B and the results summarised in Table 3.

Construction Stage	**Description**	**Approximate Duration**	**Typical Noise Levels at Receptors, dB $L_{Aeq,\ 10\ hour}$**
0 Demolition and Site Preparation	Demolition	2 weeks	55 to 68
1 CFA Piling and Concrete Structure	Piling	8 weeks	59 to 73
	Concrete Structure	40 weeks	61 to 75
2 Cladding, Power and Fit-Out	External Cladding Mechanical and Power	35 weeks	54 to 66
	Fit-Out and External Works	22 weeks	62 to 75

Table 3 - Summary of Predicted Noise Levels

6.7 Given the close proximity of the Nursery, School and residents, there is a risk that the above noise levels could be exceeded, hence it will be necessary to ensure good levels of communication with residents and noise monitoring.

Vibration Assessment

6.8 Consideration has been given to vibration levels due to construction operations and the primary activities with the potential to produce significant levels of vibration are demolition and piling.

6.9 In order to reduce noise and vibration at adjacent residential properties, the contractor has proposed the use of Continuous Flight Auger (CFA) piling.

6.10 As described in BS 5228-2, the levels of vibration associated with continuous flight auger piling are minimal, as the processes do not involve rapid acceleration or deceleration of tools in contact with the ground but rely to a large extent on steady motions.

6.11 It is considered therefore, that vibration levels from CFA piling, subject to correct operation and no ground obstructions, are not likely to exceed 1 mm/s at the nearest residential properties.

7.0 MITIGATION

Communication and Best Practicable Means

7.1 Due to the anticipated noise levels at nearby receptors, it will be necessary to ensure regular communication with residents and businesses, as stated in BS 5228-1. When particularly noisy activities are expected (eg, obstructions or works on the boundary to the nursery) then the nursery will be contacted to agree a mutually convenient time for both parties.

7.2 Perimeter hoarding shall be provided along the residential site boundaries and Best Practicable Means (as defined in Section 72 of Control of Pollution Act 1974) shall be employed throughout the demolition and construction phases.

7.3 Due to the proximity of the nursery, school and residential properties on Chalton St in particular (less than 15 metres from the site boundary), it is recommended that monitoring be undertaken throughout the project. Continuous monitoring is recommended during the noisiest periods (eg, demolition, piling and concrete structure), which will be configured to record noise levels in high resolution samples in addition to real time noise data, allowing intelligent trigger alerts to be generated and interrogated.

7.4 A minimum of two noise monitoring locations are recommended at the north-eastern and western site boundaries. The exact locations are to be determined on the basis of site constraints.

Noise Trigger Levels

7.5 It is proposed to adopt a maximum construction noise level of 75 dB $L_{Aeq,\ 10\ hour}$ outside the nearest residential properties. The following two stage alert strategy (based on hourly values) is recommended to regulate noise levels.

Measured Noise Level at the Façade of the Receiver	Recommended Action
> 75 dB $L_{Aeq, 1hr}$	Amber alert issued to the lead contractor and actions taken as appropriate to control noise levels over the 10 hour daytime period
> 80 dB $L_{Aeq, 1hr}$	Red alert issued to the lead contractor who will take immediate action to reduce noise levels.

Table 4 - Recommended Two-Stage Alert for Construction Noise

Trigger Actions

7.6 During continuous noise monitoring periods, a look-ahead trigger algorithm will be used to communicate to key construction staff who in turn can take action to limit operations on site.

7.7 Where a trigger event is considered to be genuine (determined by reviewing live noise measurement data and recorded audio), the contractor will identify the source of the noise that triggered the alert. The Contractor will undertake a risk assessment to determine the likelihood that the activity that generated the alert might generate further noise.

7.8 If a risk of increasing noise levels from the activity is identified, the Contractor will review the working method and machinery to determine whether alternatives are available that reduce the risk. The Contractor's Expert may be consulted for an external view on whether the best practicable means to minimise noise have been proposed and adopted;

7.9 In any event, noise levels will be kept under close scrutiny as the activity continues until such time as the risk of exceedance becomes negligible.

7.10 All noise monitoring equipment will comply with the Class 1 specification of BS EN 61672-1 (IEC 61672-1). Any maintenance issues will be rectified promptly so as to ensure any periods where monitoring is not taking place is as short as possible.

8.0 CONCLUSIONS

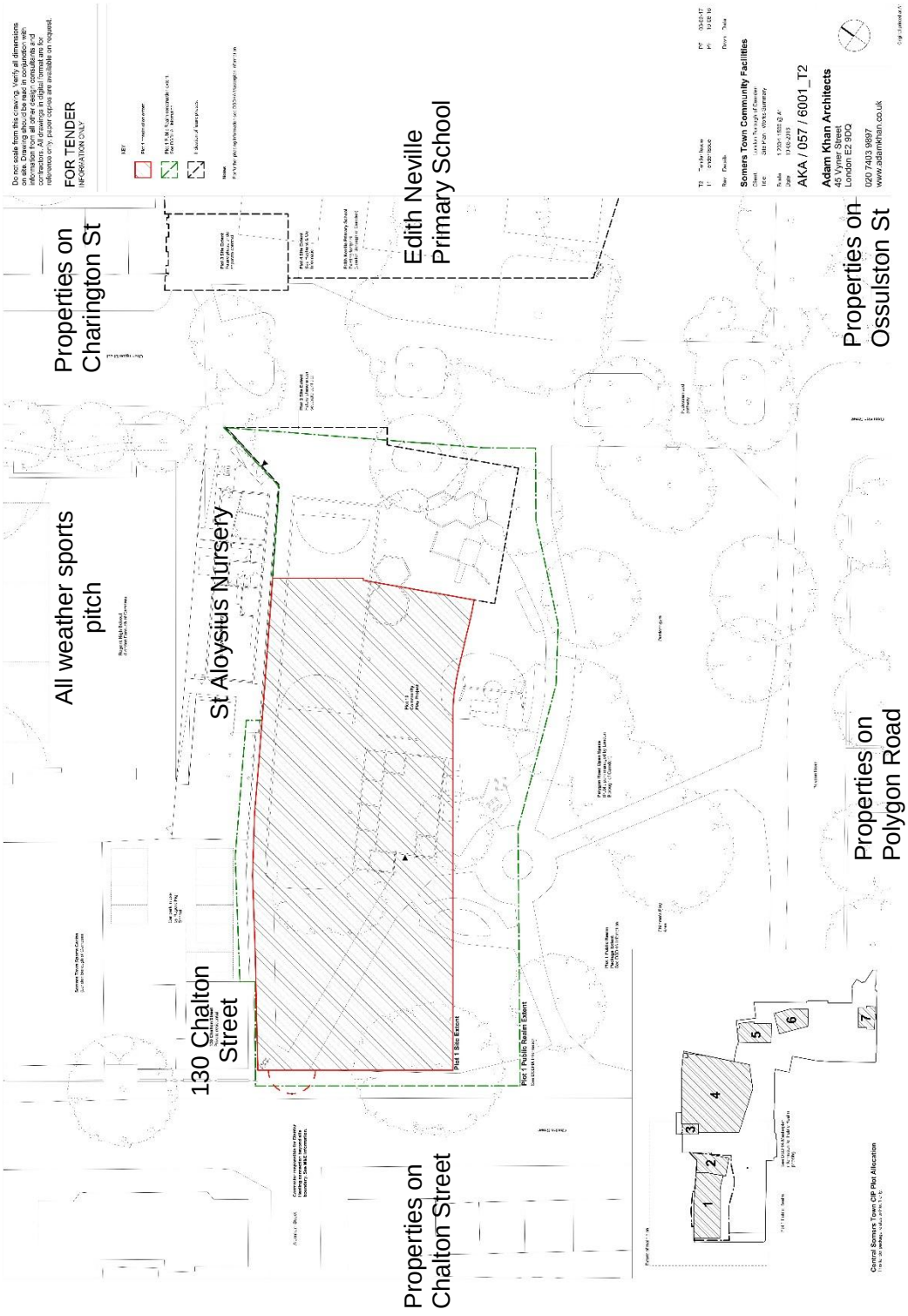
8.1 The demolition and construction vibration assessment predicts a low risk of unreasonable disturbance associated with the CFA piling, subject to correct operation and no ground obstructions.

8.2 The demolition and construction noise assessment predicts high noise levels at the nearest residential properties, indicating that complaints are considered likely. Mitigation measures have been put in place and it will be necessary to ensure close and effective communication with residents.

8.3 The proposed measures will provide a means to regulate noise levels. Construction noise monitoring will be provided and the recommended trigger alerts would allow the contractor can react quickly to reduce noise levels in the event of a complaint or trigger level being exceeded. Accordingly, two-stage trigger levels have been recommended to regulate noise levels at residential properties.

REFERENCES

1. British Standards Institution. British Standard 5228: Code of practice for noise and vibration control on construction and open sites. Parts 1 & 2, 2009.



Project: Somers Town Plot 1	**Title:** Proposed Site plan		
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A	
Date: September 2017	**Drawn By:** NM	**Job No:** 7069	

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise Levels

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in important by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

APPENDIX B: EXAMPLE CONSTRUCTION NOISE CALCULATIONS (PILING)

Construction Noise Calculation Sheet, Based upon BS 5228, 2009

PROJECT : Somers Town Plot 1
Phase : Piling

Notes :

Demolition - Chalton St

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A) distance	screening	reflection	Resultant LAeq, cycle	Activity duration %	Correct. dB	Activity LAeq
CFA Piling	107	20	50	34	5	0	68	30	-5.23	63
Excavator	105	25	50	36	5	0	64	20	-6.99	57
Dump Truck	104	20	50	34	5	0	65	30	-5.23	60
Concrete pump	102	20	50	34	5	0	63	50	-3.01	60
on-site HGV	98	25	50	36	5	0	57	33	-4.81	52

Total 10h Leq due to plant = 67

Demolition - Polygon Road

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A) distance	screening	reflection	Resultant LAeq, cycle	Activity duration %	Correct. dB	Activity LAeq
Excavator	105	50	50	43	5	0	57	20	-6.99	50
CFA Piling	107	45	50	42	5	0	60	30	-5.23	55
Dump Truck	104	50	50	43	5	0	56	30	-5.23	51
Concrete pump	102	50	50	43	5	0	54	50	-3.01	51
on-site HGV	98	45	50	42	5	0	51	33	-4.81	46

Total 10h Leq due to plant = 59

Demolition - Edith Neville Primary School

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A) distance	screening	reflection	Resultant LAeq, cycle	Activity duration %	Correct. dB	Activity LAeq
Excavator	105	40	50	41	5	0	59	20	-6.99	52
CFA Piling	107	45	50	42	5	0	60	30	-5.23	55
Dump Truck	104	40	50	41	5	0	58	30	-5.23	53
Concrete pump	102	40	50	41	5	0	56	50	-3.01	53
on-site HGV	98	45	50	42	5	0	51	33	-4.81	46

Total 10h Leq due to plant = 60

Demolition - St Aloysius Nursery

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A) distance	screening	reflection	Resultant LAeq, cycle	Activity duration %	Correct. dB	Activity LAeq
Excavator	105	10	50	27	5	0	73	20	-6.99	66
CFA Piling	107	15	50	31	5	0	71	30	-5.23	66
Dump Truck	104	10	50	27	5	0	72	30	-5.23	67
Concrete pump	102	10	50	27	5	0	70	50	-3.01	67
on-site HGV	98	15	50	31	5	0	62	33	-4.81	57

Total 10h Leq due to plant = 73

APPENDIX Q – BS5228 Rev 2 Somers Town Plot 4 – Demolition and Construction Noise and Vibration Assessment

24Acoustics

Pepper Mill Barn
Old Salisbury Lane
Romsey
SO51 0GD

T: 01794 515999

CENTRAL SOMERS TOWN, CAMDEN
PLOT 4 – EDITH NEVILLE PRIMARY SCHOOL

DEMOLTION AND CONSTRUCTION
NOISE AND VIBRATION ASSESSMENT

Technical Report: R7069-2 Rev 2

Date: 16th October 2017

For: Neilcott Construction Ltd
Excel House
Cray Avenue
Orpington
Kent
BR5 3ST

24 Acoustics Document Control Sheet

Project Title: Somers Town, Camden – Plot 4 Demolition and Construction Noise and Vibration Assessment

Report Ref: R7069-1 Rev 2

Date: 16th October 2017

	Name	Position	Signature	Date
Prepared by	Neil McLeod BA(Hons) MIOA	Senior Consultant		
Approved by	Stephen Gosling BEng MIOA	Principal Consultant		
For and on behalf of 24 Acoustics Ltd				

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CONTENTS **PAGE**

1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been retained by Neilcott Construction Ltd to undertake an assessment of the potential noise and vibration impact from the demolition and construction works associated with the redevelopment of Edith Neville Primary School, Plot 4 of the Central Somers Town Development, Camden.

1.2 This assessment has been undertaken using the site plans and build schedules provided by Neilcott Construction Ltd, relating to the proposed phases of demolition and construction.

1.3 All sound pressure levels quoted in this report are in dB relative to 20 µPa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 CRITERIA

2.1 The development has planning permission and Condition 86 requires the provision of a Construction Management Plan. Camden Council's Minimum Requirements for Building Construction and Demolition Sites (PN11, July 2016) confirms that the following information is required in relation to noise and vibration:

- Confirmation of prevailing ambient noise levels;
- Prediction of actual likely (not worst case) noise and vibration levels throughout the proposed works;
- Arrangements for noise and vibration prevention, suppression and monitoring;
- Action to be taken in case of exceedances

2.2 The document also sets out limiting operational hours for noisy activities and discusses noise abatement techniques and monitoring requirements.

3.0 SITE DESCRIPTION AND PROPOSED WORKS

3.1 Figure 1 provides an aerial image of the site and surroundings and the proposed development.

3.2 The nearest potential receptors likely to be affected by noise and vibration associated with activities on site include the existing Edith Neville Primary School (which will remain open for the duration) and residential properties on:

- Somers Close to the north;
- Purchese St to the east
- Polygon Road to the south.

3.3 The development comprises new buildings for Edith Neville Primary School. Excluding enabling works, the demolition and construction works for Block A and B have been divided into three phases with reference to the project's construction programme, as described in Table 1.

Construction Stage	Description	Approximate Duration	Typical Activities
0 Demolition and Site Preparation	Demolition	2 weeks	Demolition
1 CFA Piling and Concrete Structure	Piling	8 weeks	Sheet/CFA Piling, HGV movements, excavators, dumper, roller, generator
	Concrete Structure	20 weeks	HGV movements, excavator, dump truck, concrete pump, mobile crane
2 Cladding and Fit-Out	External Cladding Mechanical and Power	35 weeks	HGV movements, forklift truck, mobile crane, portable generators
	Fit-Out and External Works	48 weeks	HGV movements, dump truck, vibratory roller/ wacker plate

Table 1 - Summary of Construction Phases

3.4 In accordance with Camden Council's requirements, construction working hours will, where practicable, be between 08:00 and 18:00 hours Monday to Friday and 08:00 to 13:00 hours on Saturdays. There will be no works on Sundays or Public Holidays.

3.5 Internal fit out works may take place outside of the standard working hours listed above providing they are not measurable beyond the site boundary, and so as not to disturb local residents.

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British Standard 5228 Part 1: Noise

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4.2 It is proposed to compare predicted noise levels with an upper threshold of of 75 dB $L_{Aeq,\ 10\ hour}$ (Monday to Friday) and 75 dB $L_{Aeq,\ 5\ hour}$ (Saturday), as assessed at the nearest properties.

BS5228 Part 2: Vibration

4.3 Advice on assessing vibration from construction activities is given in BS 5228:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'. The standard provides an empirical method for predicting ground-borne vibration from construction works. Table B.1 of the standard provides guidance on the potential effects of vibration and is reproduced below as Table 2.

Vibration Level	Effect
0.14 mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential developments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Table 2 - Guidance on effects of Vibration Levels

4.4 Subject to good communication with the nursery, school and local residents, an upper trigger value of 1mm/s at or within neighbouring properties is considered appropriate at the nearest properties.

5.0 ENVIRONMENTAL NOISE MEASUREMENTS

5.1 Environmental noise measurements reported by Max Fordham (reference Plot 1 Community Facilities - Noise Impact Assessment Revision E, December 2015) describe prevailing daytime ambient noise levels on Purchese Street in the region of 55 dB $L_{Aeq,1\ hour}$. This level is consistent with that expected by 24 Acoustics at the nearest properties.

6.0 CALCULATIONS AND ASSESSMENT

6.1 24 Acoustics has liaised with the project engineering team to establish the likely duration and dates of the works together with the likely plant to be used during the works. This information has been used to undertake predictions of likely noise levels from the works at the nearest residential properties;

6.2 An assessment of the likely noise impact has been undertaken in accordance with the guidance of BS 5228 and noise levels from construction activities have been calculated at a number of differing distances to quantify the likely range of noise levels to which the receptors could be exposed.

Noise Assessment

6.3 Calculations of the potential noise levels generated by the demolition and construction works have been carried out using the guidance of BS 5228. The level of noise generated by the infrastructure construction activities will depend upon a range of factors, which include plant to be used, distance between source and receptor and % on-time for each item of plant.

6.4 Calculations have been undertaken for each of the identified phases and for the typical and minimum distance between each work site and the nearest receptors. Precise details relating to the construction methodology are not available so reasonable assumptions have been made with reference to the demolition and construction contractors' management plans.

6.5 Source-term noise data for the plant has been taken from the database contained in BS 5228 and also from measurements of similar plant previously undertaken by 24 Acoustics.

6.6 Example calculations are provided in Appendix B and the results summarised in Table 3.

Construction Stage	Description	Approximate Duration	Typical Noise Levels at Receptors, dB $L_{Aeq,\ 10\ hour}$
0 Demolition and Site Preparation	Demolition	2 weeks	59 to 68
1 CFA Piling and Concrete Structure	Piling	8 weeks	62 to 73
	Concrete Structure	20 weeks	63 to 72
2 Steel Structure and Fit-Out	External Cladding Mechanical and Power	35 weeks	57 to 67
	Fit-Out and External Works	48 weeks	61 to 73

Table 3 - Summary of Predicted Noise Levels

6.7 Given the close proximity of the School and residents, there is a risk that the above noise levels could be exceeded, hence it will be necessary to ensure good levels of communication with residents and noise monitoring.

Vibration Assessment

6.8 Consideration has been given to vibration levels due to construction operations and the primary activities with the potential to produce significant levels of vibration are demolition and piling.

6.9 In order to reduce noise and vibration at adjacent residential properties, the contractor has proposed the use of Continuous Flight Auger (CFA) piling.

6.10 As described in BS 5228-2, the levels of vibration associated with continuous flight auger piling are minimal, as the processes do not involve rapid acceleration or deceleration of tools in contact with the ground but rely to a large extent on steady motions.

6.11 It is considered therefore, that vibration levels from CFA piling, subject to correct operation and no ground obstructions, are not likely to exceed 1 mm/s at the nearest residential properties.

7.0 MITIGATION

Communication and Best Practicable Means

7.1 Due to the anticipated noise levels at nearby receptors, it will be necessary to ensure regular communication with residents and businesses, as stated in BS 5228-1. When particularly noisy activities are expected (eg, obstructions or works on the boundary to the nursery) then the school will be contacted to agree a mutually convenient time for both parties.

7.2 Perimeter hoarding shall be provided along the residential site boundaries and Best Practicable Means (as defined in Section 72 of Control of Pollution Act 1974) shall be employed throughout the demolition and construction phases.

7.3 Due to the proximity of the nursery, school and residential properties in particular (less than 15 metres from the site boundary), it is recommended that monitoring be undertaken throughout the project. Continuous monitoring is recommended during the noisiest periods (eg, demolition, piling and concrete structure), which will be configured to record noise levels in high resolution samples in addition to real time noise data, allowing intelligent trigger alerts to be generated and interrogated.

7.4 A minimum of two noise monitoring locations are recommended at the north west and south west site boundaries. The exact locations are to be determined on the basis of site constraints.

Noise Trigger Levels

7.5 It is proposed to adopt a maximum construction noise level of 75 dB $L_{Aeq,\ 10\ hour}$ outside the nearest residential properties. The following two stage alert strategy (based on hourly values) is recommended to regulate noise levels.

Measured Noise Level at the Façade of the Receiver	Recommended Action
> 75 dB $L_{Aeq, 1hr}$	Amber alert issued to the lead contractor and actions taken as appropriate to control noise levels over the 10 hour daytime period
> 80 dB $L_{Aeq, 1hr}$	Red alert issued to the lead contractor who will take immediate action to reduce noise levels.

Table 4 - Recommended Two-Stage Alert for Construction Noise

Trigger Actions

7.6 Noise monitoring with a look-ahead trigger algorithm will be used to communicate to key construction staff who in turn can take action to limit operations on site.

7.7 Where a trigger event is considered to be genuine (determined by reviewing live noise and vibration measurement data and recorded audio), the contractor will identify the source of the noise or vibration that triggered the alert. The Contractor will undertake a risk assessment to determine the likelihood that the activity that generated the alert might generate further noise.

7.8 If a risk of increasing noise levels from the activity is identified, the Contractor will review the working method and machinery to determine whether alternatives are available that reduce the risk. The Contractor's Expert may be consulted for an external view on whether the best practicable means to minimise noise have been proposed and adopted;

7.9 In any event, noise levels will be kept under close scrutiny as the activity continues until such time as the risk of exceedance becomes negligible.

7.10 All noise monitoring equipment will comply with the Class 1 specification of BS EN 61672-1 (IEC 61672-1). Any maintenance issues will be rectified promptly so as to ensure any periods where monitoring is not taking place is as short as possible.

8.0 CONCLUSIONS

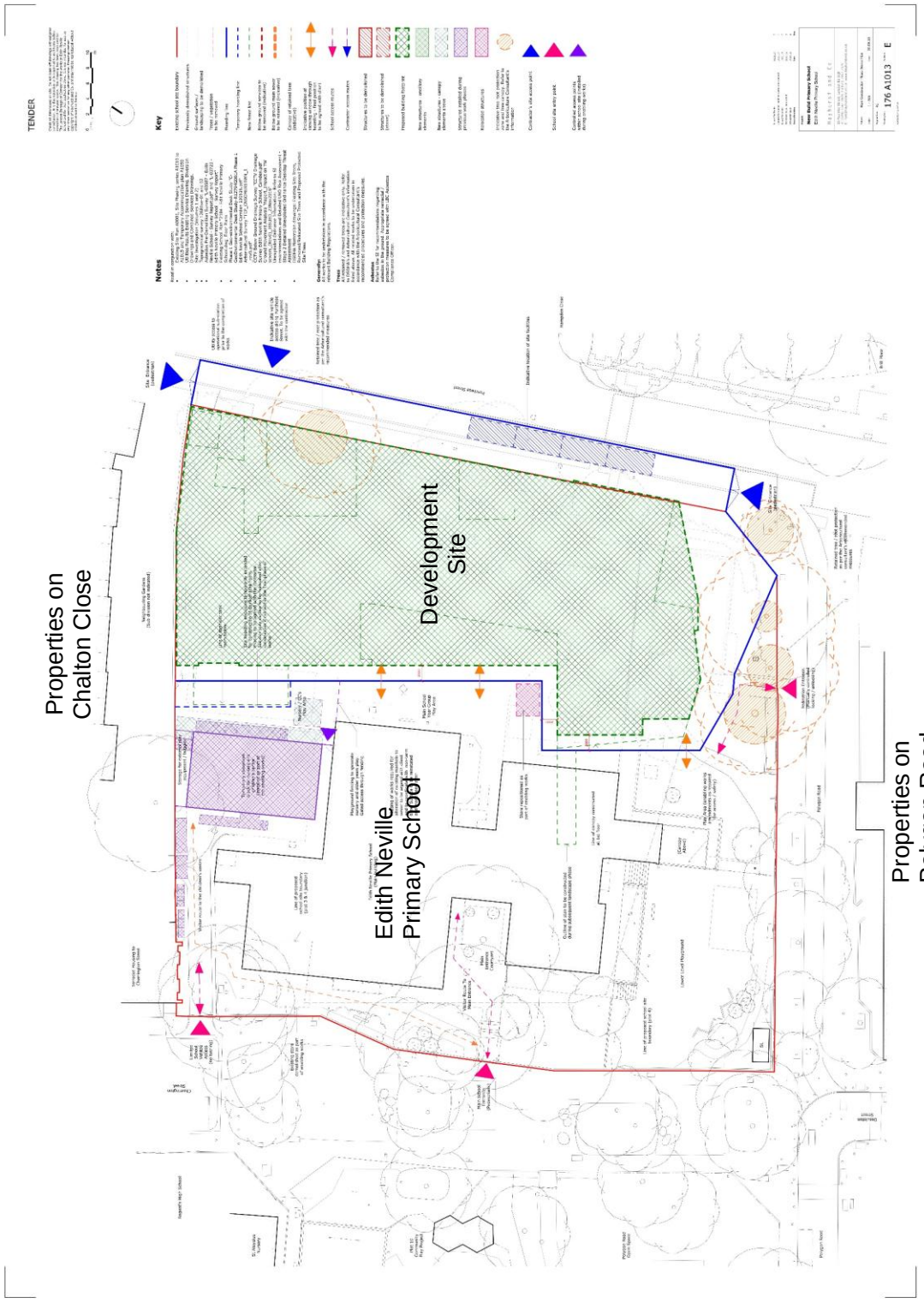
8.1 The demolition and construction vibration assessment predicts a low risk of unreasonable disturbance associated with the CFA piling, subject to correct operation and no ground obstructions.

8.2 The demolition and construction noise assessment predicts high noise levels at the nearest residential properties, indicating that complaints are considered likely. Mitigation measures have been put in place and it will be necessary to ensure close and effective communication with residents.

8.3 The proposed measures will provide a means to regulate noise levels. Construction monitoring will be provided and the recommended trigger alerts would allow the contractor can react quickly to reduce noise levels in the event of a complaint or trigger level being exceeded. Accordingly, two-stage trigger levels have been recommended to regulate noise levels at residential properties.

REFERENCES

1. British Standards Institution. British Standard 5228: Code of practice for noise and vibration control on construction and open sites. Parts 1 & 2, 2009.



Project: Somers Town Plot 4	**Title:** Proposed Site plan		
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A	
Date: September 2017	**Drawn By:** NM	**Job No:** 7069	

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise Levels

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in important by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

APPENDIX B: EXAMPLE CONSTRUCTION NOISE CALCULATIONS (PILING)

Construction Noise Calculation Sheet, Based upon BS 5228, 2009

PROJECT : Somers Town Plot 4
Phase : Piling

Notes :

Piling and Excavation - Chalton Close

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A) distance	screening	reflection	Resultant LAeq, cycle	Activity duration %	Correct. dB	Activity LAeq
CFA Piling	107	15	50	31	5	0	71	30	-5.23	66
Excavator	105	20	50	34	5	0	66	20	-6.99	59
Dump Truck	104	15	50	31	5	0	68	30	-5.23	63
Concrete pump	102	15	50	31	5	0	66	50	-3.01	63
on-site HGV	98	20	50	34	5	0	59	33	-4.81	54

Total 10h Leq due to plant = 70

Piling and Excavation - Polygon Road

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A) distance	screening	reflection	Resultant LAeq, cycle	Activity duration %	Correct. dB	Activity LAeq
Excavator	105	35	50	39	5	0	61	20	-6.99	54
CFA Piling	107	30	50	38	5	0	64	30	-5.23	59
Dump Truck	104	35	50	39	5	0	60	30	-5.23	55
Concrete pump	102	35	50	39	5	0	58	50	-3.01	55
on-site HGV	98	30	50	38	5	0	55	33	-4.81	50

Total 10h Leq due to plant = 62

Piling and Excavation - Edith Neville School

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A) distance	screening	reflection	Resultant LAeq, cycle	Activity duration %	Correct. dB	Activity LAeq
Excavator	105	10	50	27	5	0	73	20	-6.99	66
CFA Piling	107	15	50	31	5	0	71	30	-5.23	66
Dump Truck	104	10	50	27	5	0	72	30	-5.23	67
Concrete pump	102	10	50	27	5	0	70	50	-3.01	67
on-site HGV	98	15	50	31	5	0	62	33	-4.81	57

Total 10h Leq due to plant = 73