GILLIERON SCOTT
ACOUSTIC DESIGN

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For:
Robert Loader
Architect
RIBA Conservation Register

30 Walkerscroft Mead
London SE21 8LJ

tel - 020 8761 1120
mob - 0794 880 1144

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PRHPS OUTDOOR PLAY
NOISE IMPACT ASSESSMENT

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Document Revision	Date	Document Title	Details	Prepared by	Approved by
00	17th June 2016	PRHPS Outdoor Play Noise Impact Assessment 17062016.Pdf	Draft for comment	Tim Scott 	Paul Gillieron 
01	24th June 2016	PRHPS Outdoor Play Noise Impact Assessment 17062016.Pdf	Final Issue	Tim Scott 	Paul Gillieron 

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1.0 INTRODUCTION

Gillieron Scott Acoustic Design have been appointed to carry out a desktop noise impact assessment for a proposed raised Nursery Outdoor play area at the Primrose Hill Primary School, Camden, London.

The proposed Nursery Outdoor play area is to be erected in place of an existing out building along the boundary wall of the school at an average height of 1.6m from the ground. The minimum barrier height to the boundary will be 1.8m.

Noise levels from existing outdoor play areas have been estimated and predictions of future noise level after the proposed development has been made based on the number of users and their locations.

The results of the study are presented in the following sections of this report.

2.0 DESIGN TARGETS

2.1 Activity Noise to Local Residents

There are no specific noise limits specified by local authorities at residential facades for noise emanating from school playgrounds. However, it is recommended that when taken in context of the existing site conditions the likelihood of disturbance to the adjacent residential dwellings is not significantly increased by the proposals.

2.2 Typical Background Noise Levels

Typical L_{AeqT} background noise levels measured at Kingsgate School (a similar site in Camden) between 8am and on a school day were 52dB $L_{AeqT.}$ This is typical for a daytime London background noise level in a sheltered location and has been used as a benchmark in the desktop study.

A chart of the survey results has been included in the Appendix.

It is also noted that the site is relatively close to railway lines which may cause regular fluctuations in background noise levels at the residential facades which may be similar to those caused by the existing school.

3.0 PREDICTED NOISE LEVELS AND NOISE MAPPING

3.1 Noise Mapping - Outdoor Playtimes

A noise mapping model has been constructed to determine the impact of the proposed outdoor terrace.

GSAD have been advised that the existing outdoor areas are used by the school at the following times by the numbers of children indicated.

Existing school outdoor playtimes:
Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception)
free flow play all day

KS1 – Y1 & 2 ages 5-7 Lower playground (180 children)
10:35 – 10:50
12:15 – 1:30

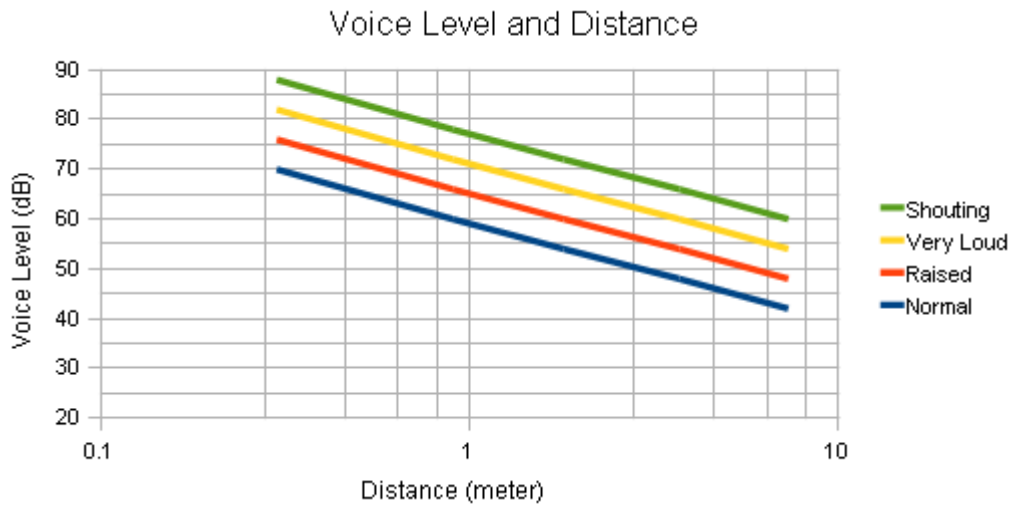
KS2 Y3, 4, 5 & 6 ages 7 - 11 Upper playground (270 children)
10:35 – 10:50
12:30 – 1:30

PE sessions are taught outside in both playgrounds x 30 children at a time. These would be between 9-10:10 / 10:50 – 12:00 and 1:30 – 3:30

3.2 Noise Mapping - Model Assumptions

3.2.1 Noise Levels from Children

Typical noise levels from voices of 65dBA at 1m as shown below have been used in the model for noise levels emanating from each user of the outdoor spaces. The model also assumes that 50% of occupants of the outdoor areas/playgrounds would be speaking in a raised voice at any one time as a worst case.



Source: EngineeringToolbox.com

3.2.2 Noise Mapping - Building and Wall Heights

It has been assumed that surrounding residential buildings are approximately 10m height (3 storeys) based on images and internet maps as shown in the Appendices. The height of the wall separating the school and Waterside Place has been taken as 3.2m high as measured from the Waterside Place side of the wall.

3.3 Noise Mapping - Predicted Existing Noise Levels

Based on the information on play times and occupancy number a worst case noise model has been constructed for comparison.

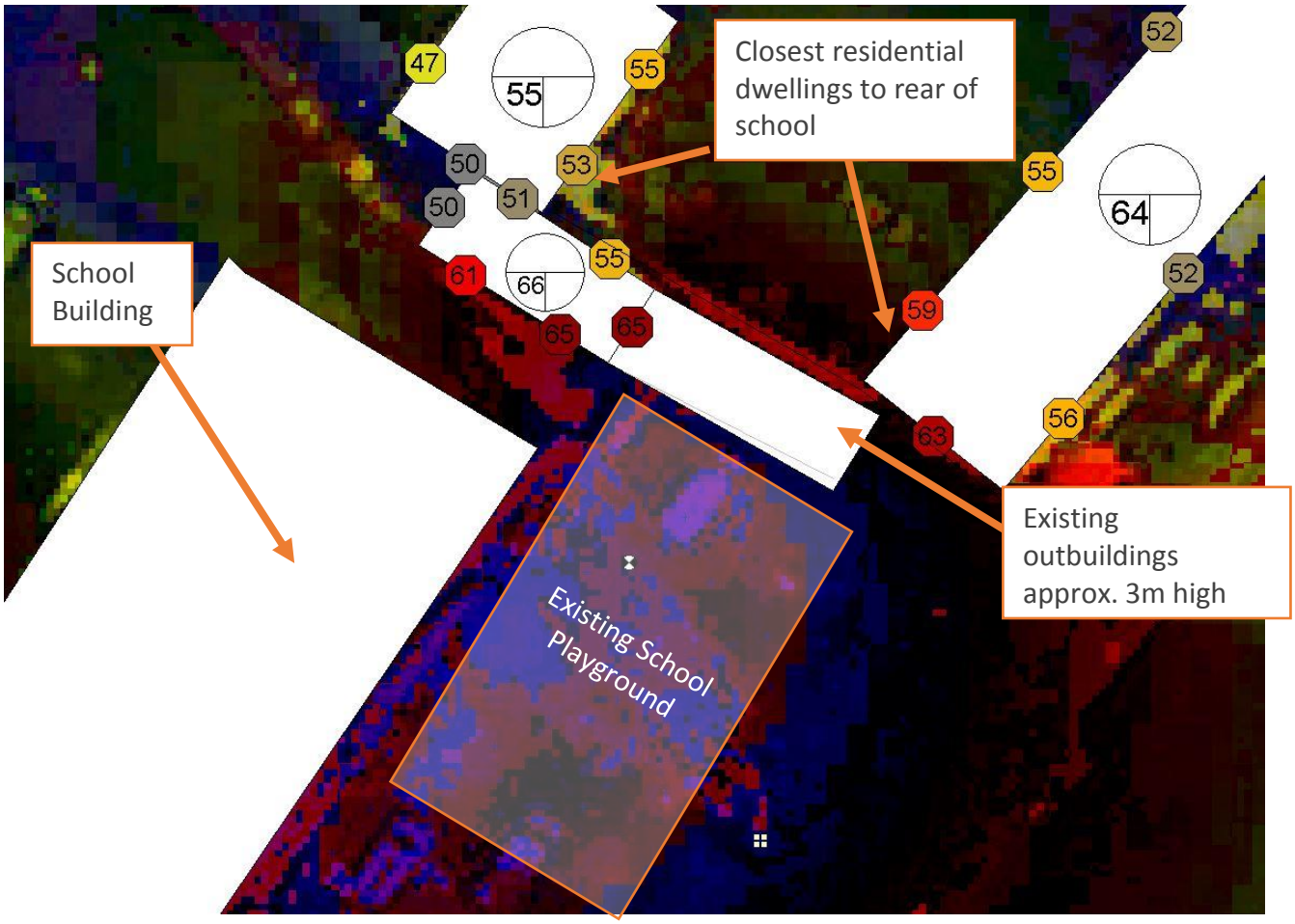
Due to the fact that the proposed raised Nursery area could be in use at any time of the day the noise mapping model has been set to assess quietest period of the day as being only when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day in addition to the contribution of cyclical noise from the junior school activities.

Hence fifty noise sources calibrated to 65dBA at 1m have been spread across the existing playground to predict existing noise levels when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day.

Models have been assessed as worst case façade levels and at ground floor levels to determine the likely impact on ground floor external amenity areas.

Worst Case Façade Levels

The resultant CadnaA Noise mapping results as worst case façade levels are shown below.

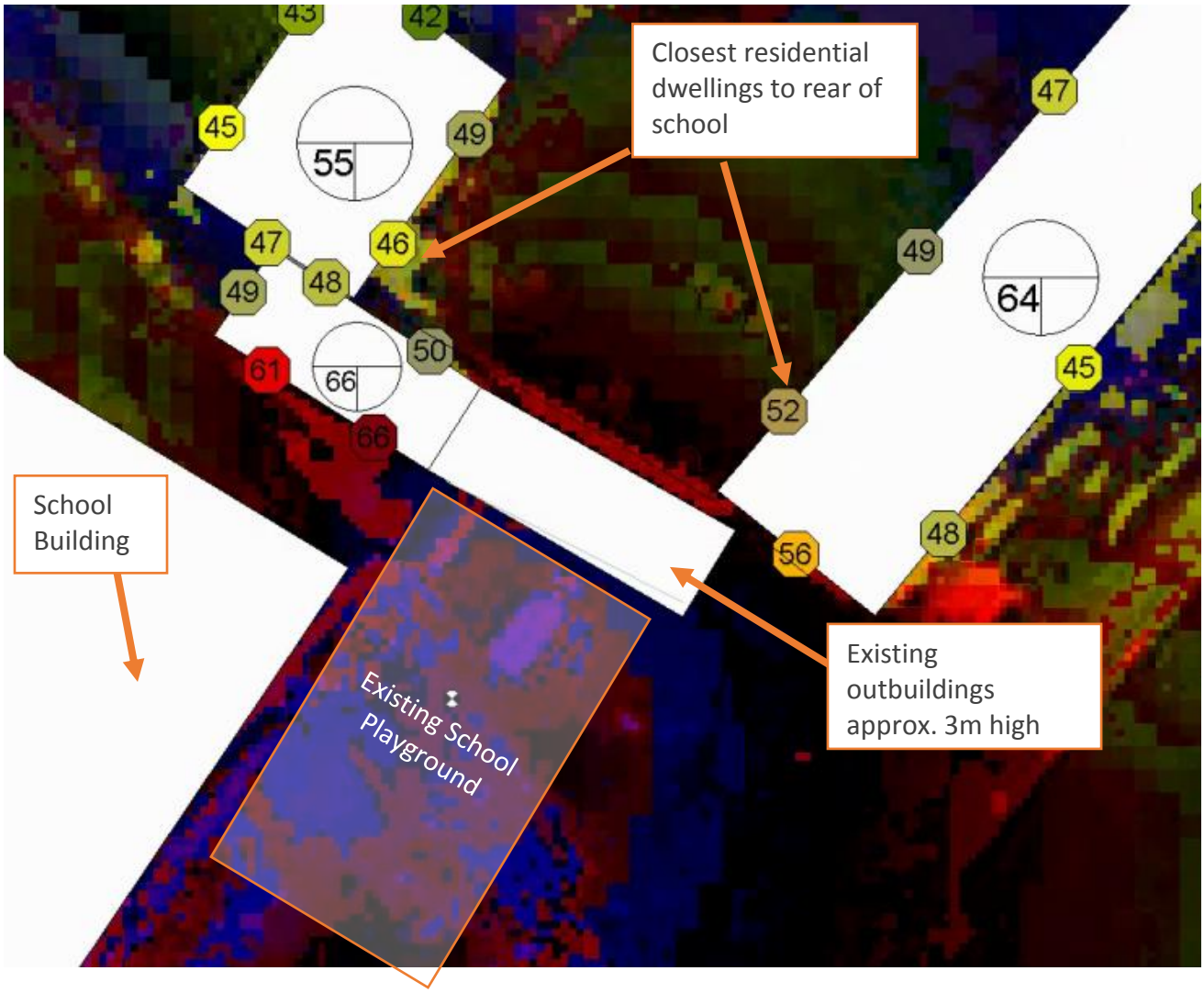


The results show that noise levels at residential facades are approximately 60dBA as a worst case when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day.

This level would rise to approximately 67dBA when the playground is in use at break times which last 1.5 hrs per school day.

Ground floor external amenity areas

The resultant CadnaA Noise mapping results at ground floor levels are shown below.



The results show that noise levels at residential facades are approximately 52dBA as a worst case when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day.

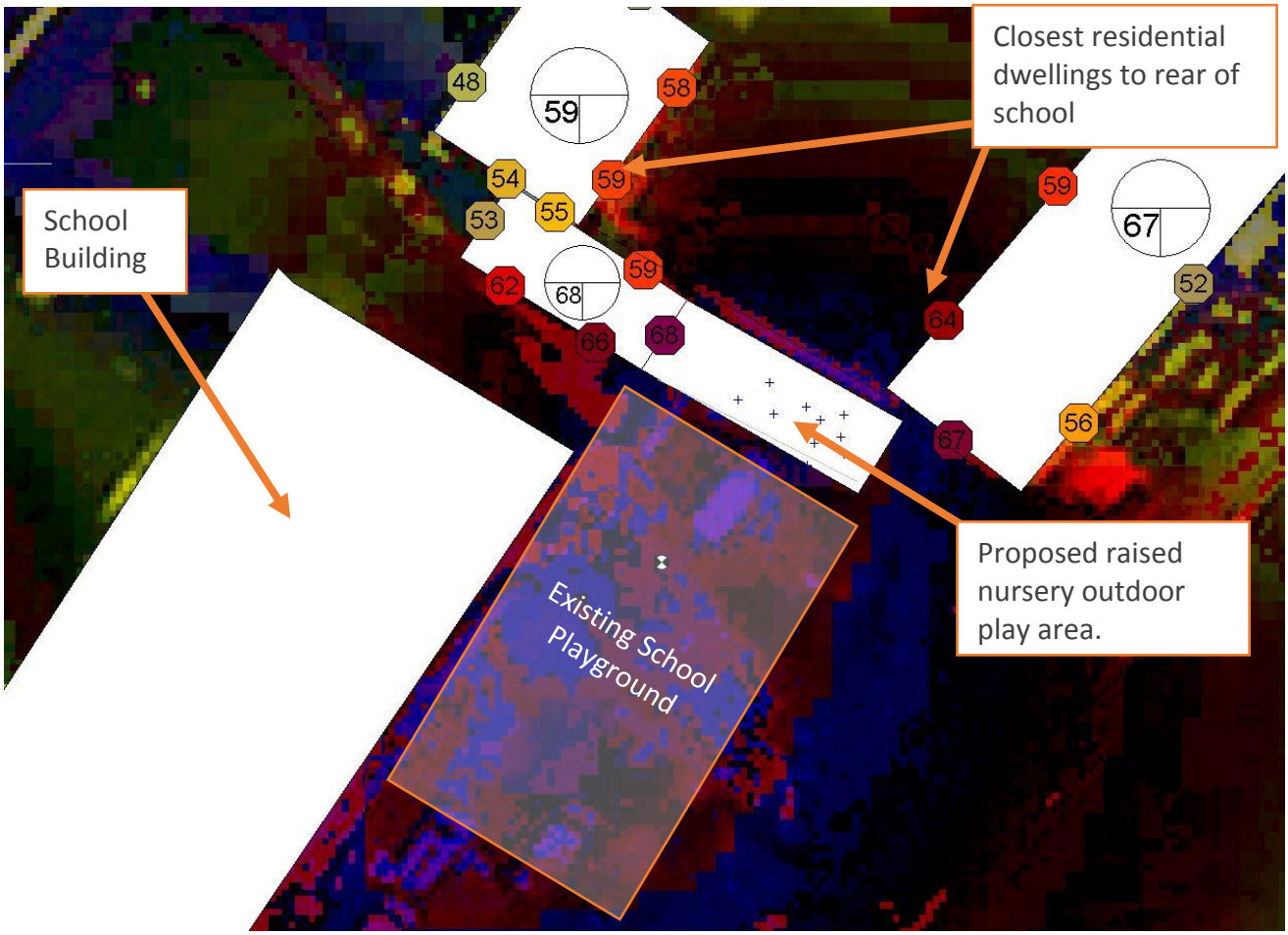
This is lower than at higher façade levels due to the screening effect of the existing brick boundary wall.

3.4 Noise Mapping - Predicted Noise Levels with Proposed Terrace

Predicted noise levels from the terrace have been modelled assuming that Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day with 20 of these children on the proposed raised deck.
Models have been assessed as worst case façade levels and at ground floor levels to determine the likely impact on ground floor external amenity areas.

Worst Case Façade Levels

The resultant CadnaA Noise mapping results as worst case façade levels are shown below.



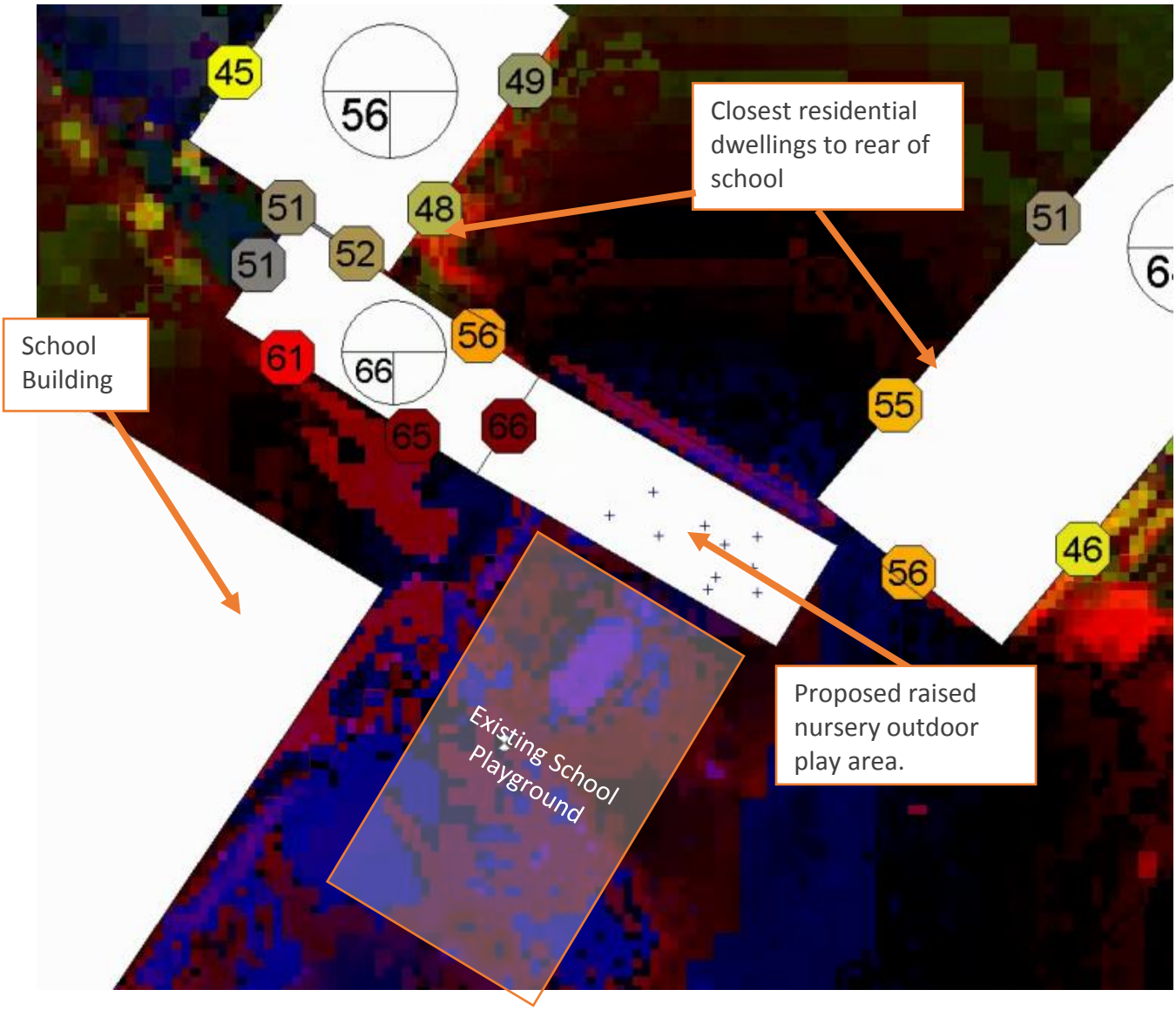
The results show that noise levels at residential facades are approximately 64dBA as a worst case when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day and 20 Nursery are on the proposed raised deck area. This is an increase of 5dBA when compared to the predicted existing noise at the closest residential windows on Waterside Place.

GSAD are of the opinion that the likely noise impact to neighbours from the proposed raised nursery deck would be from individual raised voices from teachers or a raised voice from a few children rather than from 50% of the terrace occupants. A reduction in the predicted number occupants making noise to 2 rather than 10 would result in a 1dBA predicted increase in background noise levels at the residential facades which would be of marginal significance.

The worst case predicted noise levels from the proposed raised area are predicted to be 3dBA lower than predicted noise levels of 67dBA when the playground is in use at break times (1.5 hrs per school day).

Ground floor external amenity areas

The resultant CadnaA Noise mapping results at ground floor levels are shown below.



The results show that noise levels at residential facades are approximately 55dBA as a worst case when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day and 20 Nursery are on the proposed raised deck area. This is an increase of 3dBA when compared to the predicted existing noise at the closest residential external amenity areas on Waterside Place.

This is lower than at higher façade levels due to the screening effect of the existing brick boundary wall. The rear gardens for the houses in Waterside Place facing the canal are unaffected by the proposed raised nursery deck.

3.5 Noise Mapping – Impact on Prevailing Background Noise Levels

As discussed in Section 2 it is anticipated that prevailing background noise level averages will be circa 52dBA on site and as a result it is predicted that existing playground noise is approximately 7dBA above the estimated average prevailing background noise levels and hence, clearly audible at the residential facades when the worst case comparative model conditions re in effect. i.e. when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day.

It is also predicted that existing noise levels rise to approximately 67dBA, 15dBA above the average prevailing background noise levels at residential facades during break times when all the children are permitted outside.

The impact on external amenity noise is minimal as the brick boundary wall and proposed nursery deck screens provide a significant amount of sound attenuation to ground floor areas.

4.0 DISCUSSION

The noise mapping model predictions detailed in section 3 show that the background noise levels will rise by approximately 5dBA at the closest residential receptor during worst case times when the terrace is fully occupied. There will be no significant impact on the residential dwellings from the terrace at normal playtimes as the predicted worst case noise from the terrace is approximately 3dB below the predicted playground noise and the likelihood of complaints arising from the terrace will be low at these times.

The existing and proposed models both use the same source noise levels for occupants and the assumption that 50% of occupants are speaking in a raised voice. The noise levels used represent a worst case scenario where the external terrace and playground is fully occupied.

In order to clarify the intended use of the space The Family and Childcare Trust have provided an appraisal of the scheme included in Appendix D which states the following.

"The number of children will vary at any point in the day since one key principle is that there should be a free flow between the indoor and outdoor space. The maximum number of children who could be in the outdoor space at any one given time would be 20 once the provision is at full capacity, but it is unlikely that all children would, in reality, be outside together for any prolonged period, if at all.

Outdoor play will involve the activities described above, these being running, jumping, stretching, climbing, pulling, pushing, crawling, sliding, turning, bending, touching, rolling, squeezing and tumbling and rough and tumble play.

It is difficult to imagine how these types of activities could cause a major noise pollution issue in the immediate environment."

GSAD agree with the Family and Childcare Trust appraisal and in reality two year old children do not tend to play in groups in the same way as older children. They are more likely to be playing individually, resulting in less "group" noise which is more likely to occur with older children.

Hence, GSAD are of the opinion that the likely noise impact to neighbours from the proposed raised nursery deck would be from individual raised voices from teachers, or raised voices from a few children rather than from 50% of the terrace occupants. A reduction in the predicted number of terrace occupants generating "raised voice" noise levels to 2 rather than 10 would result in a 1dBA

predicted increase in background noise levels at the residential facades, which would be of marginal significance when taken in context of the existing site conditions.

In addition, the existing playground noise emanating from the school at the residential facades is predicted to be approximately 7dBA above estimated average prevailing background noise levels of circa 52dBA. Hence, existing playground noise is predicted to be clearly audible at the residential facades without the raised terrace. Depending on the number of occupants of the terrace, noise levels are predicted to increase by between 1dBA and 5dBA at the residential receptors. The existing playground noise from the school is clearly audible throughout the day when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day and at higher levels during break times when all the children are permitted outside. As a result, it is predicted that this increase will not significantly increase the likely impact in the residential dwellings when taken in context of the existing site conditions.

The impact on external amenity noise is minimal as the brick boundary wall and proposed nursery deck screens provide a significant amount of sound attenuation to ground floor residential areas. The rear gardens for the houses in Waterside Place facing the canal are unaffected by the proposed raised nursery deck and the rear gardens to houses with frontage to Princess Road show a 2dB increase.

5.0 CONCLUSION

A desktop study of existing outdoor play noise and the addition of a proposed raised Nursery Outdoor play area at the Primrose Hill Primary School, Camden, London has been carried out.

The noise mapping predictions show that the existing playground noise when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day in the playground is 59dBA, 7dBA above the average estimated prevailing background noise levels on site. It is also predicted that noise levels currently rise to approximately 67dBA, 15dBA above the average estimated prevailing background noise levels at residential facades during break times when all the children are permitted outside. Hence, it is predicted that the existing playground noise during these times is clearly audible at the surrounding residential dwellings.

With the introduction of the proposed 2 year olds nursery terrace noise mapping predictions show that in the proposed worst case (quietest) circumstances when Nursery & Reception Ages 3 – 5 (39 Nursery / 60 Reception) are having free flow play all day the noise emanating from the proposed new terrace will increase noise levels at the closest residential receptor upper facades by approximately 1dBA- 5dBA depending on the number of occupants making noise on the terrace.

When taken in context for the site the high levels of existing levels of noise emanating from the school will reduce the apparent impact of the predicted noise increases from the proposed 2 year olds nursery terrace at the upper level residential facades and terraces.

The noise mapping predictions show that the impact on external amenity noise at ground floor level is minimal due to the screening provided by the existing boundary walls and proposed barriers. Hence the proposals are unlikely to lead to adverse comment at ground floor level.

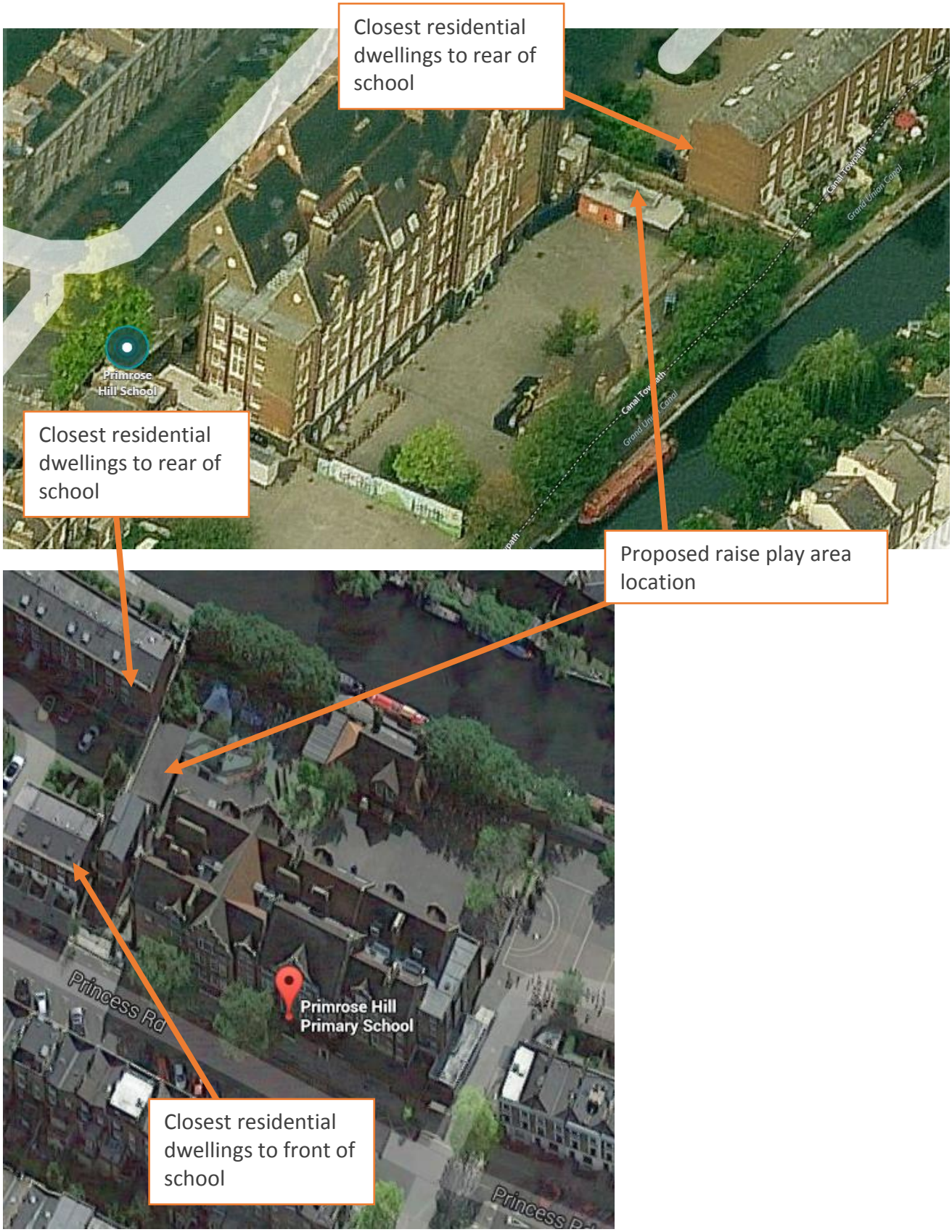
FIGURES

FIGURE 1: SITE PHOTOS


Closest residential dwellings to rear of school


Closest residential dwellings with a 1st floor outdoor amenity space to rear of school

FIGURE 2: 3D VIEWS




Closest residential dwellings to rear of school
Proposed raise play area location
Closest residential dwellings to front of school

FIGURE 3: EXISTING SECTIONS AND ELEVATIONS

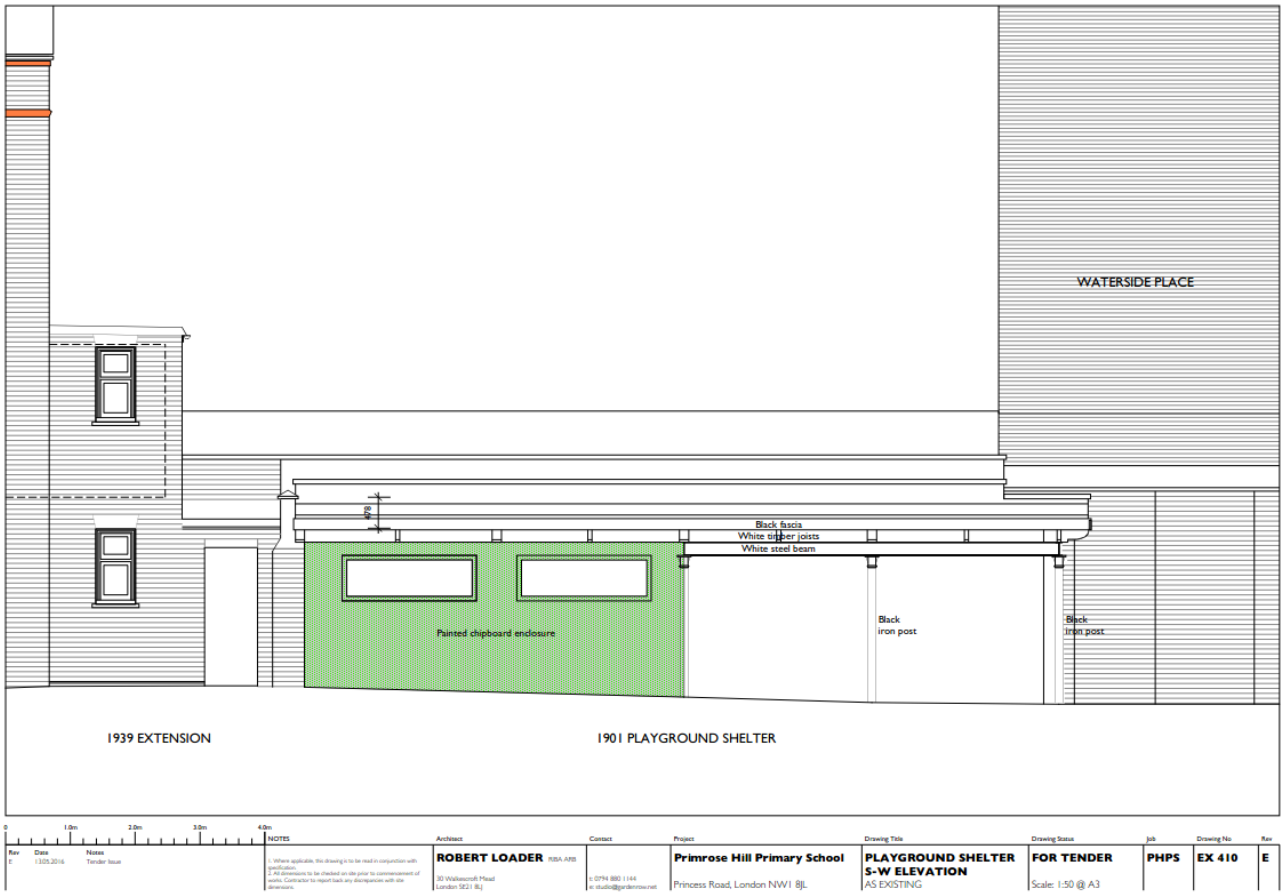
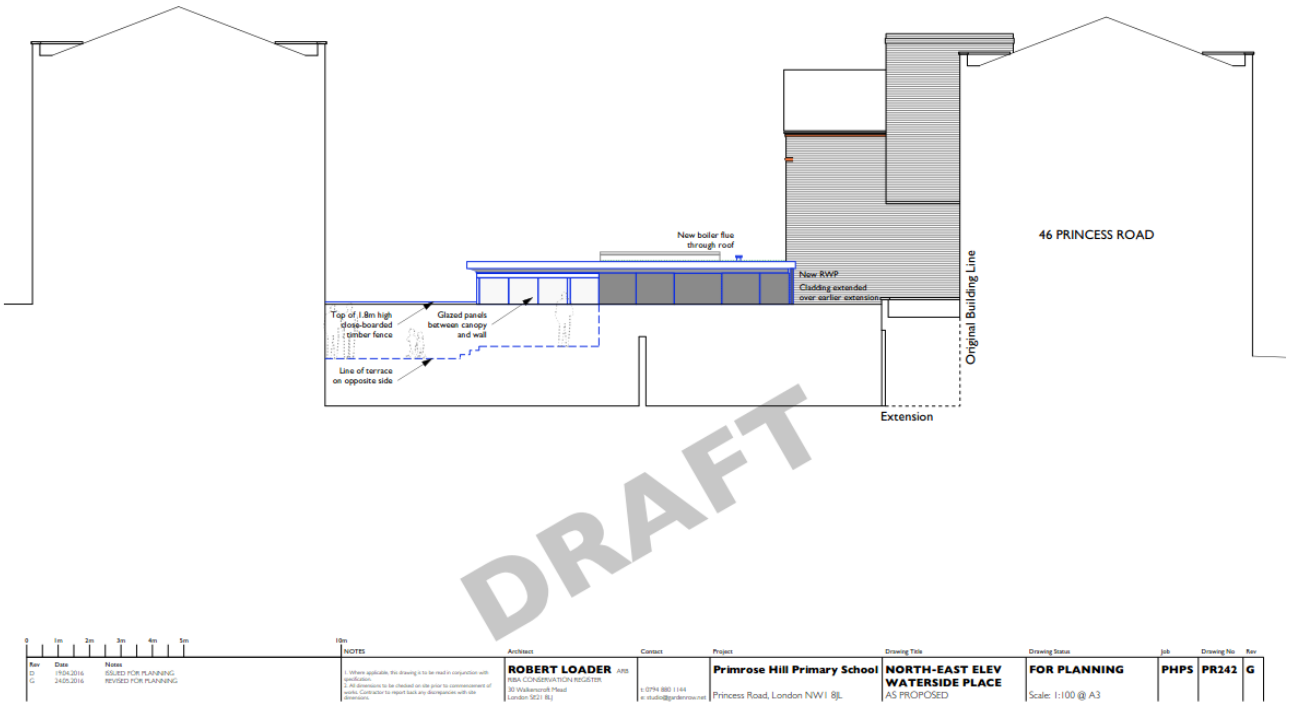


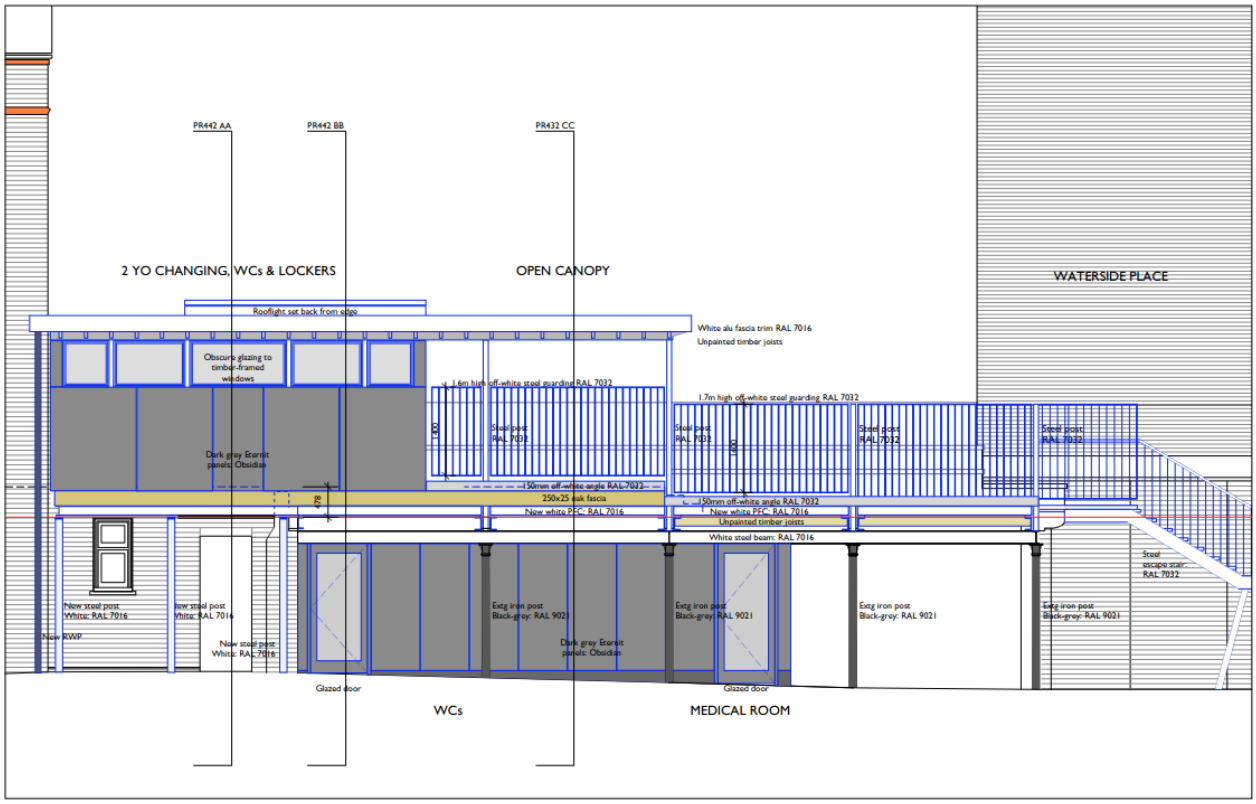
FIGURE 4: PROPOSED SECTIONS AND ELEVATIONS



Rev	Date	Notes
D	19.04.2016	ISSUED FOR PLANNING
G	24.05.2016	REVISED FOR PLANNING

NOTES
1. Where applicable, this drawing is to be read in conjunction with specification.
2. All dimensions to be checked on site prior to commencement of works. Contractor to report back any discrepancies with site dimensions.

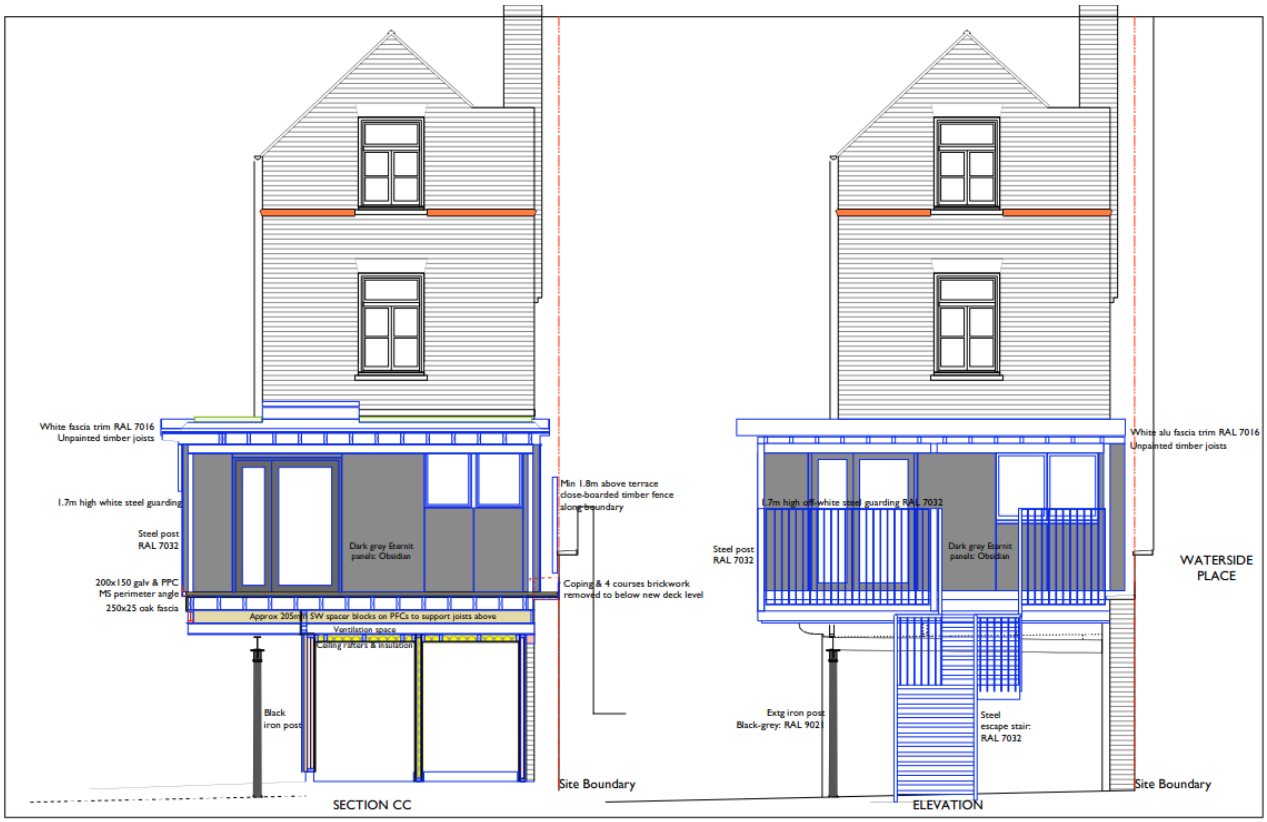
Architect	Contact	Project	Drawing Title	Drawing Status	Job	Drawing No	Rev
ROBERT LOADER ARB RIBA CONSERVATION REGISTER 30 Walkerscroft Mead London SE21 8LJ	t: 0794 880 1144 e: studio@garderrow.net	Primrose Hill Primary School Princess Road, London NW1 8JL	NORTH-EAST ELEV WATERSIDE PLACE AS PROPOSED	FOR PLANNING Scale: 1:100 @ A3	PHPS	PR242	G



Rev	Date	Notes
E	13.05.2016	Tender Issue

NOTES
1. Where applicable, this drawing is to be read in conjunction with specification.
2. All dimensions to be checked on site prior to commencement of works. Contractor to report back any discrepancies with site dimensions.

Architect	Contact	Project	Drawing Title	Drawing Status	Job	Drawing No	Rev
ROBERT LOADER RIBA ARB 30 Walkerscroft Mead London SE21 8LJ	t: 0794 880 1144 e: studio@garderrow.net	Primrose Hill Primary School Princess Road, London NW1 8JL	2 YO EXTENSION S-W ELEVATION AS PROPOSED	FOR TENDER Scale: 1:50 @ A3	PHPS	PR 412	E


White fascia trim RAL 7016
Unpainted timber joists
1.7m high white steel guarding
Steel post
RAL 7032
200x150 galv & PPC
MS perimeter angle
250x25 oak fascia
Dark grey Eternit
panels: Obsidian
Min 1.8m above terrace
close-boarded timber fence
along boundary
Coping & 4 courses brickwork
removed to below new deck level
Approx 205mm SW spacer blocks on PFCs to support joists above
Ventilation space
Ceiling rafters & insulation
Black
iron post
Site Boundary
SECTION CC
White alu fascia trim RAL 7016
Unpainted timber joists
1.7m high off-white steel guarding RAL 7032
Steel post
RAL 7032
Dark grey Eternit
panels: Obsidian
WATERSIDE
PLACE
Extg iron post
Black-grey: RAL 9021
Steel
escape stair:
RAL 7032
Site Boundary
ELEVATION
0
1.0m
2.0m
3.0m
4.0m
Rev
Date
Notes
1
13.05.2016
Tender Issue
NOTES
1. Where applicable, this drawing is to be read in conjunction with specification.
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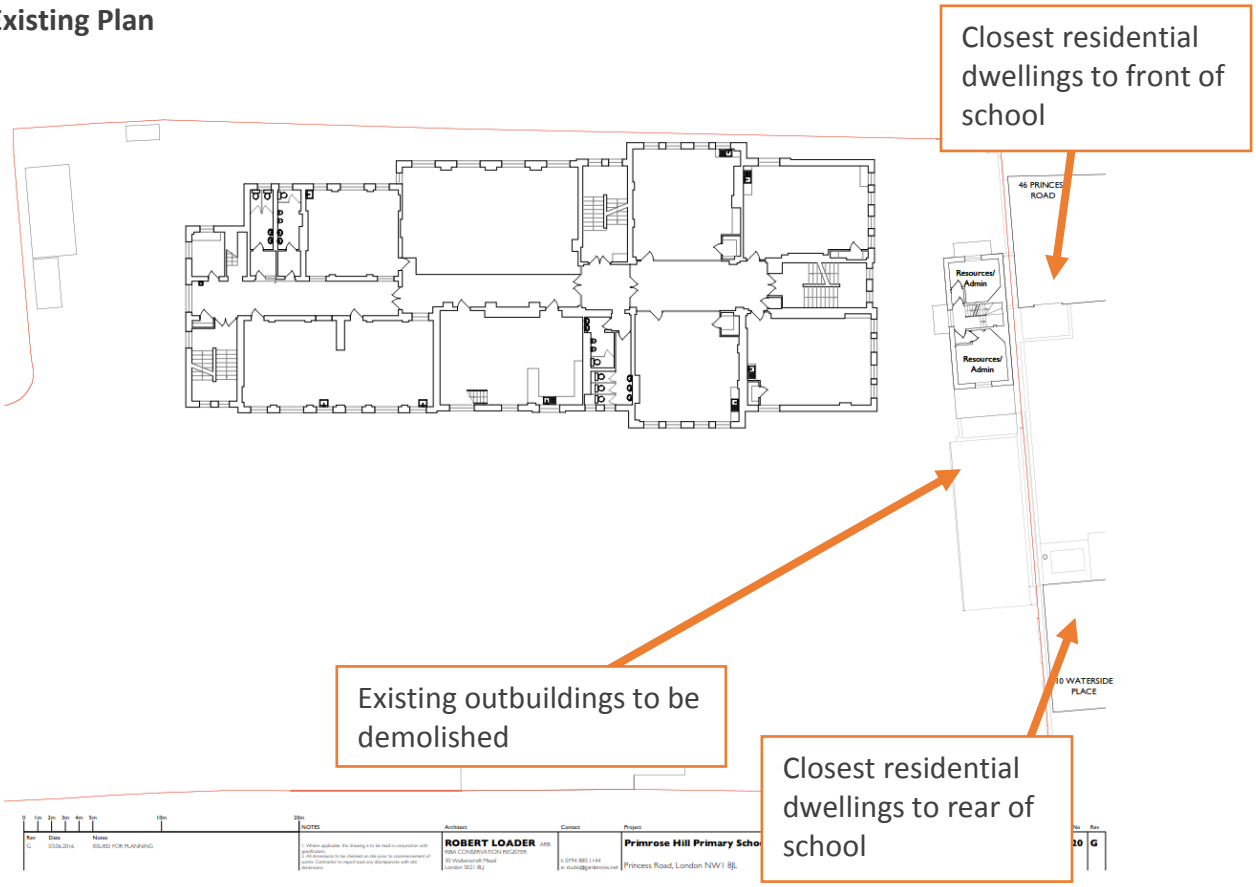
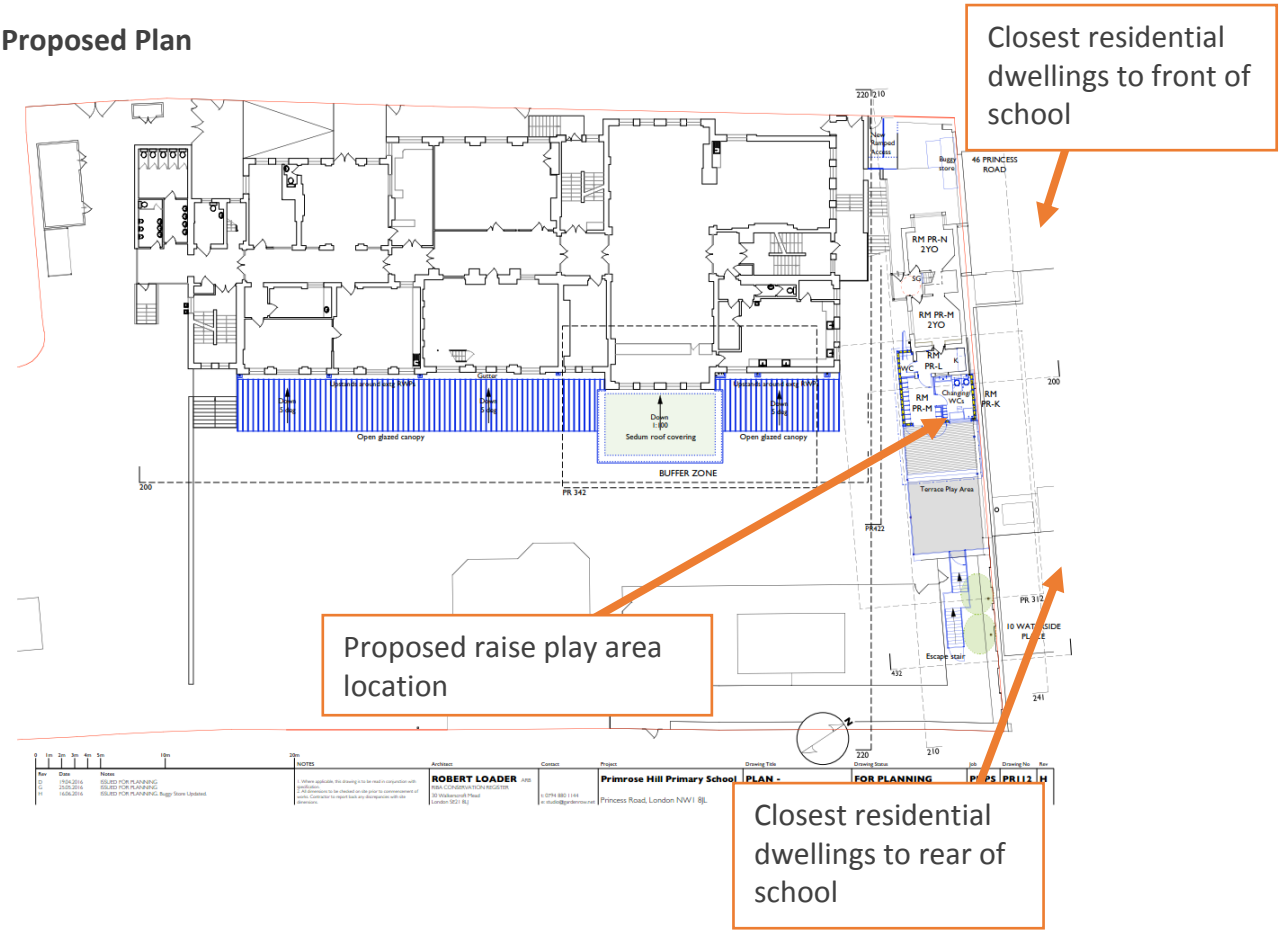
Architect
ROBERT LOADER RIBA ARB
30 Walkscroft Mead
London SE21 8LJ
Contact
t: 0794 880 1144
e: studio@gardenrow.net
Project
Primrose Hill Primary School
Princess Road, London NW1 8JL
Drawing Title
2 YO EXTENSION
SECTION CC & ELEVATION
AS PROPOSED
Drawing Status
FOR TENDER
Scale: 1:50 @ A3
Job
PHPS
Drawing No
PR_432
Rev
E

FIGURE 5: EXISTING AND PROPOSED PLANS

Existing Plan



Proposed Plan



APPENDICES

APPENDIX A: GLOSSARY OF ACOUSTIC TERMS

DECIBEL (dB) - A unit of sound pressure measurement
Sound Pressure Level in dB (*L*p) = 20 log (Measured sound pressure/Reference sound pressure = 20 µPa)

dB(A) - The A -weighted sound pressure level, the weighting network reduces low frequency sound in a similar way to the human ear.

REVERBERATION TIME (RT or *T*) – decay of sound in rooms
The time taken for a sound, once terminated, to fall through 60dB i.e. to one millionth of its original sound intensity. *T*30 – RT for first 30dB of decay. RT_{500} - Mid frequency RT.
HERTZ (Hz) - a unit of frequency measurement. The normal range of hearing is from 20Hz to about 15kHz.

ABSORPTION COEFFICIENT – degree to which a material absorbs sound.
The ratio of absorbed to incident sound energy (perfect absorber = 1)

SOUND REDUCTION INDEX *R* – quantity which describes a material's ability to reduce the sound pressure level across it (e.g. a wall or floor)

$R = L1 - L2 + 10\log (S/A)$

*L*1 - Average sound pressure level in source room (averaged from 100 Hz – 3150 Hz)
*L*2 - Average sound pressure level in receiving room (averaged from 100 Hz – 3150 Hz)
S – Wall Area (m^2)
A – Total absorption in receiving room (m^2 units)

*R*w – weighted sound reduction index

AVERAGE ROOM TO ROOM LEVEL DIFFERENCE – *D*, dB = *L*1 – *L*2, averaged 1/3 octave bands from 100Hz – 3150kHz.

*D*w – weighted value of D (usually 2 - 3dB higher)

*D*nT, w – *D*w corrected for reverberation time of receiving room

NOISE RATING CURVES (NR CURVES) – set of curves used to describe optimum background noise levels for different tasks.

*L*10/90 LEVEL (dB) - The level in dB of a time varying sound pressured level (e.g. traffic) exceeded for 10%/90% of the time of measurement.
*L*90 is usually called the BACKGROUND NOISE LEVEL.

*L*eq AVERAGE SOUND PRESSURE LEVEL – level dB of a time varying sound pressure level with equal amounts of energy above and below it, for the time of measurement.

TONAL NOISE – noise of a single frequency (or a narrow band of frequencies that can be perceived as a tone), audible above the broad band noise background. Noise which is at least 5dB above the average of the 1/3 octave band sound pressure levels immediately on either side of it.

APPENDIX B: NOISE INDICES

The equipment was set to record octave band sound pressure levels at 15minute intervals. The following noise indices used in this assessment are as follows:

$L_{Aeq,T}$: The A-weighted equivalent continuous sound pressure level over a period of time, T.

$L_{Amax,T}$: The A-weighted maximum sound pressure level that occurred during a given period. Measured using the fast (L_{AFmax}) or slow (L_{ASmax}) time weightings.

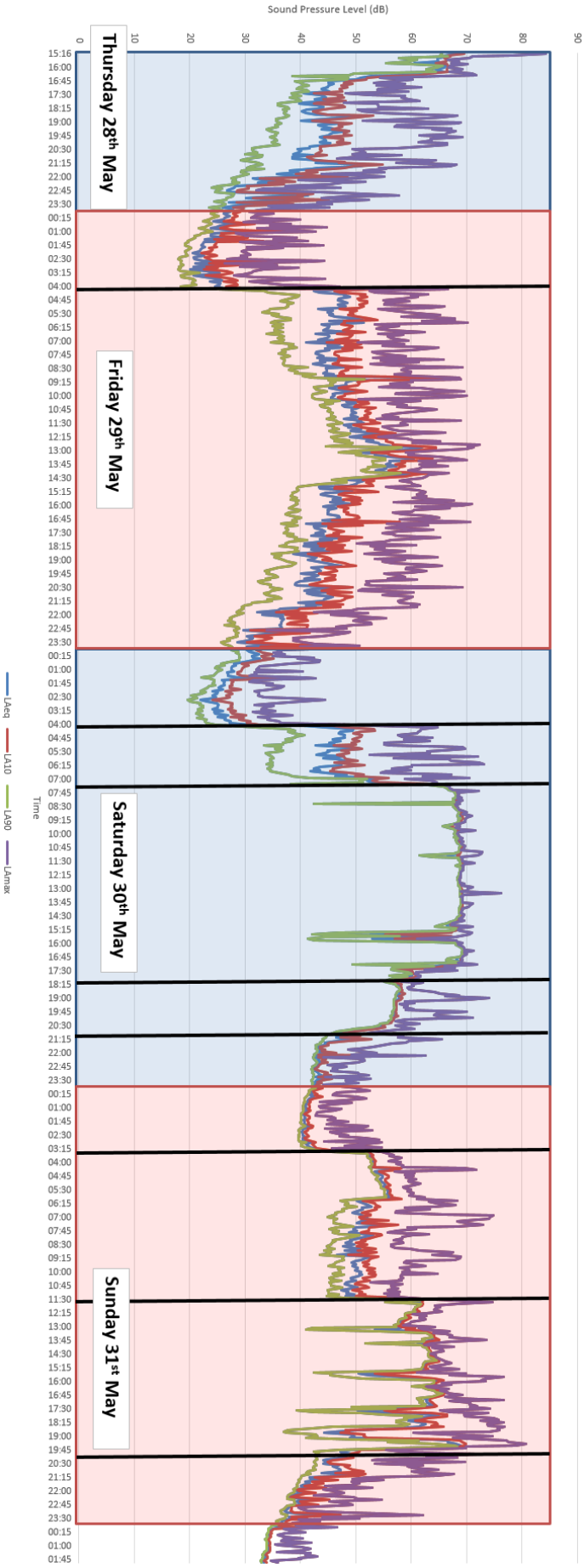
$L_{A90,T}$: The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background noise level.

$L_{A1,T}$: The A-weighted sound pressure level exceeded for 1% of the measurement period. Indicative of the maximum noise level.

The L_{A90} is considered most representative of the background noise level for the purposes of complying with any Local Authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

APPENDIX C: COMPARATIVE NOISE SURVEY GRAPH



APPENDIX D: FAMILY AND CHILDCARE TRUST APPRAISAL

Family and Childcare Trust
Creating a family friendly UK

A short note on acoustics and outside play for planning in respect of the two year old provision at Primrose Hill Primary School

1. The principles of play for two year olds

Expert advice on the key principles of play for two year olds is encapsulated in the following quotes:

"The exploration and engagement of two-year-olds, as they experience the world with their whole bodies, emphasises the vital role of leaders in ensuring that the indoor and outdoor learning environment/learning space is appropriate and convenient for the age and stage of the children using it on a daily basis … Children may remain in the learning space for extended time, encompassing the beginning and the end of each day and including a range of transitions during that time. [It is important to] *recognise this variation and support teams in planning for children's needs at different times during the day and also for new experiences to be available so that children are both stimulated in their learning and nurtured in their daily routines."*[1]

"…research … shows that very young children need access to a learning space that enables them to experience running, jumping, stretching, climbing, pulling, pushing, crawling, sliding, turning, bending, touching, rolling, squeezing and tumbling. Equally, very young children need regular experience of being held, wrapped, stroked, squeezed and also being involved in rough and tumble play. She suggests that proprioceptive stimulation can be encouraged if resources provided within (and the layout of) the indoor and outdoor learning environment enables lifting and carrying activities, opportunities to push objects around, to sweep with brushes (often aspects of children's early imaginative and creative play) and activities that involve a child's muscles in heavy work as indicated above."[2]

2. Implications of applying good practice in the principles of play for two year olds at Primrose Hill

The number of children will vary at any point in the day since one key principle is that there should be a free flow between the indoor and outdoor space. The maximum number of children who could be in the outdoor space at any one given time would be 20 once the provision is at full capacity, but it is unlikely that all children would, in reality, be outside together for any prolonged period, if at all.

Outdoor play will involve the activities described above, these being running, jumping, stretching, climbing, pulling, pushing, crawling, sliding, turning, bending, touching, rolling, squeezing and tumbling and rough and tumble play.

It is difficult to imagine how these types of activities could cause a major noise pollution issue in the immediate environment.

Diane Dixon
Family and Childcare Trust Consultant
May 2016

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[1] National College for Teaching and Leadership, 'Being and becoming': under threes in focus Leadership in the early years, 2013

[2] [2] National College for Teaching and Leadership, 'Being and becoming': under threes in focus Leadership in the early years, 2013 quoting Jean Ayres in *Sensory Integration and the Child: Understanding Hidden Sensory Challenges (revised edition 2005)*