Devereux

New Services' Plant at the National Hospital for Neurology and Neurosurgery's (NHNN) Chandler Wing

Design & Access Statement - July 2015

planning.

a PM Group company

For further information, please contact:

Ruth James (Senior Project Architect)
PM Devereux
200 Upper Richmond Road
London SW15 2SH
T +44 20 8780 1800
F +44 20 8780 2646
E ruth.james@pmdevereux.com
W www.pmdevereux.com

Contents

Reference	Issue Number	Date	Intial
GB101011016	**Issue 1**	**24.07.2015**	**RJ**

Executive Summary

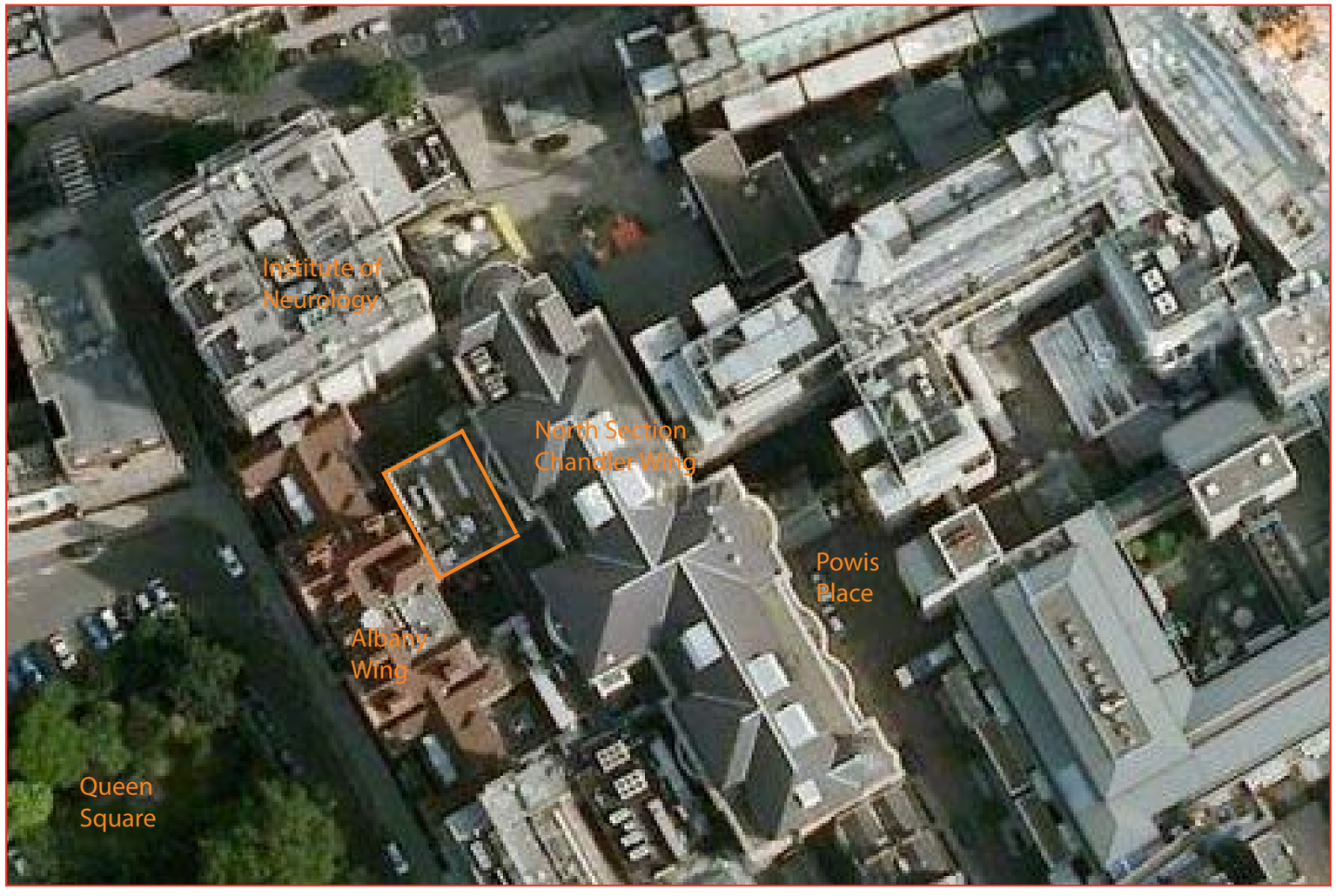
This document is the Design and Access Statement in support of a full planning application for a new services' plant and structural deck which is to be introduced within a central, completely enclosed courtyard, on the roof of the first floor of the north section of the Chandler Wing at the National Hospital for Neurology and Neurosurgery (NHNN).

This new services' plant will support the creation of a new operating suite, including two new theatres which will be located within the reconfigured second floor of the north section of the Chandler Wing.

The construction of this new operating suite will enable the NHNN to expand its capacity of operating theatres from 4 to 6.

This project forms part of University College London Hospitals Trust's (UCLH) overall transformation programme for a 20 year clinical strategy for the NHNN.

This document includes a Noise Survey report produced by Hilson Moran which verifies that the new service plant equipment is compliant with LB Camden's planning guidance.



Above Aerial View

The Site - Existing

The Chandler Wing was completed in 1995 and is part of the NHNN.

It is a six storey hospital building arranged over basement, ground and five upper floors.

The building was designed with a reinforced concrete frame construction and completed with non-loadbearing brickwork elevations, UPVC double glazed windows and doors, and cantilevered balconies with white railings.

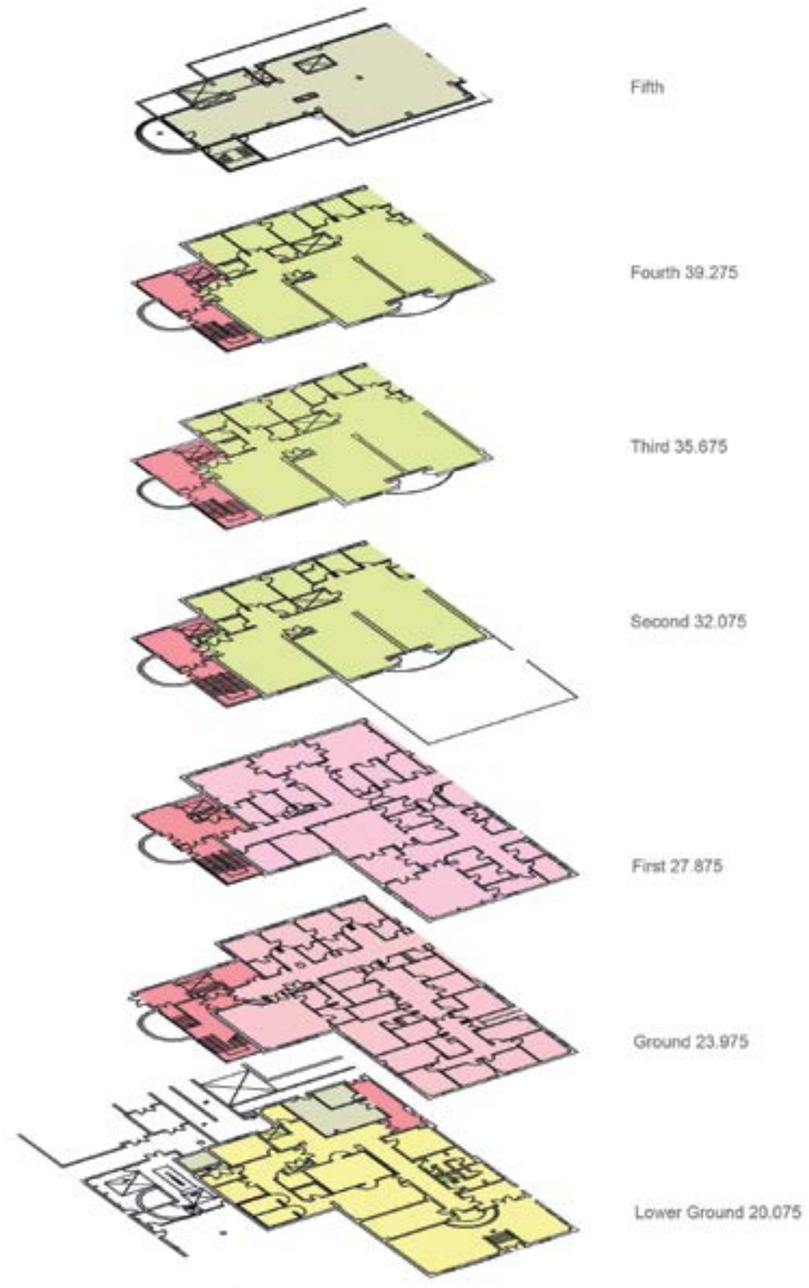
The Chandler Wing is located in a constricted urban site off of Queen Square, to the south of Guildford Street, with its front elevation addressing Powis Place.

The location of the new service plant and deck is a completely enclosed central courtyard on the roof of the first floor of the north section of Chandler Wing and is surrounded by the Institute of Neurology, part of UCL, to the north and the NHNN'S grade II listed Albany Wing to the west.

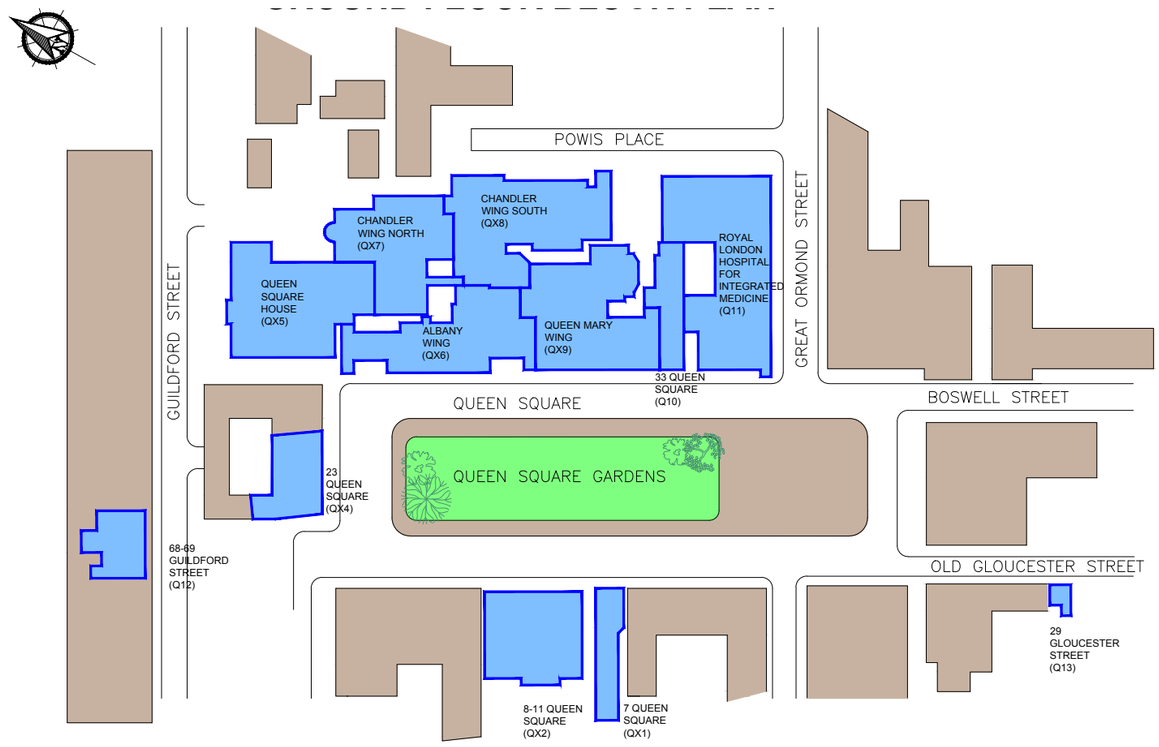
This enclosed central courtyard is not visible from the street or Queen Square.

The Chandler Wing falls within the Bloomsbury Conservation Area.

Currently the Chandler Wing houses accommodation includes 4 operating theatres suite, HTU and ITU, neurosurgery wards , as well as a MRI, general diagnostics and out-patient's clinic.



Above North Section Chandler Wing Stacking Diagram



Above Block Diagram

The Design Proposal

Currently the 2nd floor of the north section of the Chandler Wing is configured as a hospital ward, which is mechanical ventilation at a rate of 6 air changes per hour. To enable a new operating suite to be created in this area, its mechanical ventilation needs to be increased by over four times its current provision to 25 air changes per hour. 25 air changes per hour per operating theatre, a requirement to achieve Hospital Technical Memorandum (HTM) compliance. As a result a new plant was required as the existing service infrastructure is not able to accommodate this additional demand.

A new location for the additional plant is also required, as the existing plant room serving the Chandler Wing has no capacity for the installation of more equipment. In addition, no suitable duct routes could be identified from the plant room to the north section of the 2nd floor of the Chandler Wing.

Consequently, following numerous feasibilities, it was proposed that the adjacent external roof courtyard was the only viable position to locate this new plant.

This roof courtyard currently has the basement's restaurant and the ground floor clean room's plant fitted to it. As a result it was proposed that the new Air Handling Units (AHUs) would be supported on a 180m² structural deck at a new level above this existing plant.

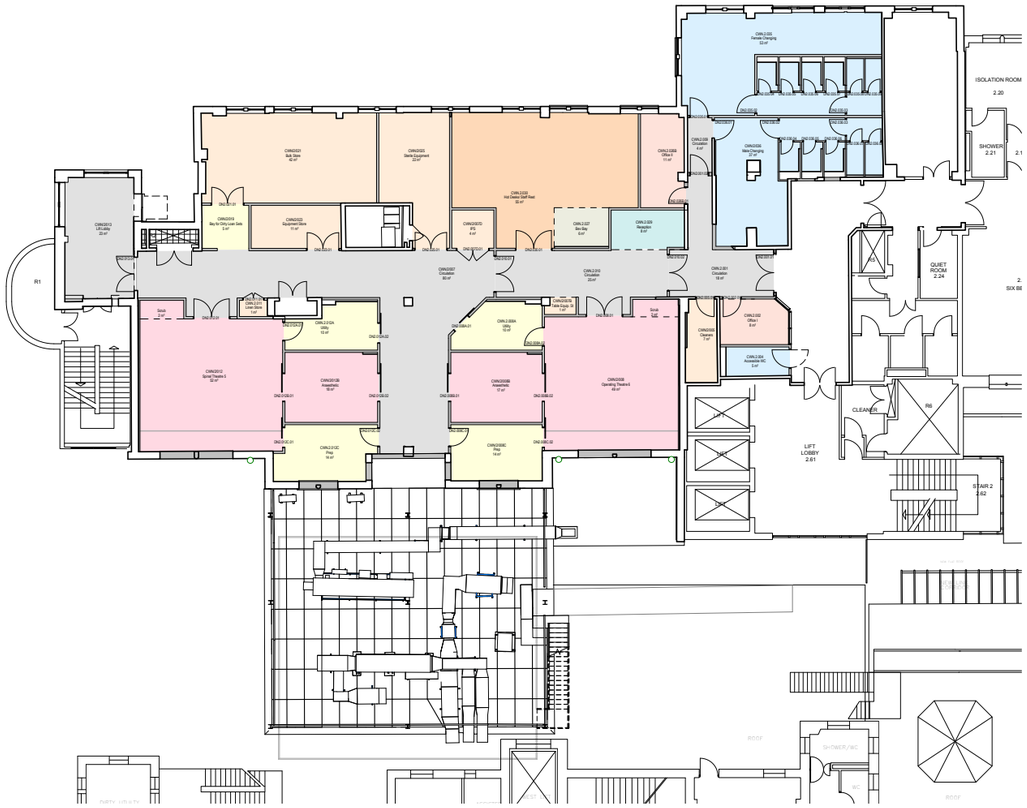
Currently the existing external roof courtyard and plant is accessed by an existing second floor walkway. A new stair access will link to the side of this walkway to provide access to the new external plant. This access is to be used by suitably trained and authorised maintenance personnel only. The existing disabled access arrangement to the building for the general public and patients will not be affected by this proposal.

As the new plant will be situated in an enclosed courtyard, there will be no impact on the exterior elements of the building visible from any public roads or Queen Square.

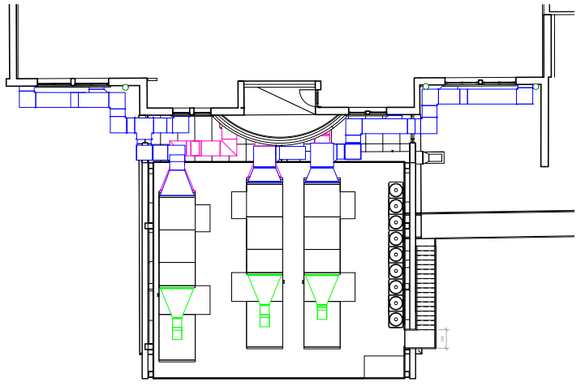
The existing adjacent 2nd floor UPVC windows and doors on the west elevation of the Chandler Wing will be removed and blocked up with brickwork to match existing. This will allow the proposed external ductwork from the new air handling units to enter the theatre suite beneath the existing structural lintels in the external elevation.

An acoustic noise survey has been provided as an appendix to this document.

The theatre suite is to include anaesthetic rooms, preparation rooms, recovery and staff changing.



Left Second Floor Plan Chandler Wing



Right Third Floor Roof Deck Plan

Context

The National Hospital for Neurology and Neurosurgery (NHNN)was founded in 1859 and is the UK's largest dedicated neurological and neurosurgical hospital treating over 6,000 inpatients, 120,000 outpatients and 8,000 day cases each year.

The hospital was founded by Louisa and Joanna Chandler for the care of the paralysed and epileptic. Money for this building was raised by HRH Duke of Albany and opened by his brother Edward, Prince of Wales, in 1884. The Albany Wing building was built in Queen Square between 1883-5 by M P Manning and J Simpson with the Chandler Wing being added in 1995.

Celebrating 150 years in 2010, the NHNN provides comprehensive services for the diagnosis, treatment and care of all conditions that affect the the brain, spinal cord, peripheral nervous system and muscles.

It is also part of the University College London Hospitals Foundation Trust.

Above The National Hospital of Neurology, Albany Wing.

Site Views

Clockwise from Right
1 View West - Albany Wing
2 View North - Institute of Neurology
3 View East - North Section, Chandler Wing
4 View lSouth - South Section, Chandler Wing
5 View North West - Albany Wing / IoN

Layout

Plant Deck

The new 180m² plant deck structural form is to be a separate independently stable frame construction connected to the external first floor structure of the Chandler Wing. The plant deck floor will be a 130mm lightweight RC composite slab and steel decking. The slab can sufficiently support large point loads and therefore provides greater flexibility compared to a light weight steel grated floor.

The composite slab will be supported by UC steel beams. Heavier but shallower UC beams have been proposed to minimise the height of the deck.

The UC steel beams cantilever over the column supports at two ends of the structure.

The steel beams are supported onto UC steel columns.

A suitable clearance gap will be allowed between the plant structure and the existing adjacent structures to allow for differential movements and for construction tolerance.

All of the structural steel and steel connections are to be galvanised. Each structure will be designed to resist wind forces acting and any lateral destabilising forces.

The plant deck will be stabilised by the RC composite slab and shear studs connected to the supporting steel beams. This creates a horizontal diaphragm action to transfer lateral loads to the vertical stabilising members.

Vertical stability will be achieved using cross bracing in perimeter bays in the two primary directions.

New RC plinths will be constructed at column locations.

Stair Access Structure

A new stair access is to be constructed to provide access to the new plant deck. The stair will link to the side of the existing second floor walkway that provides access to the existing plant area.

The stair structure will be formed by cantilevering the top and bottom landings and supporting the stair stringers in between.

The high level landing will be formed by structural steel beams cantilevering from the plant deck structure. The low level landing will be formed by cantilevering new structural steel beams from the existing RC structure at first floor.

The structural steel channels are to be used as stair stringers to frame steps.

The steps are proposed as steel angles supported between the channel stringers.

Above Existing Revit Model **Below** Proposed Revit Model

The Air Handling Units

The 3No. air handling units are: 9000mm (L) x 1915mm (W) x 2380mm (H)
The 3No. external condensers are: 2440mm (L) x 760mm (W) x 1710mm (H).

The air-handling units are Goose wing grey in colour with an aluminum frame and Pastisol external cladding.

Left External Condenser

Right Air Handling Unit

Function

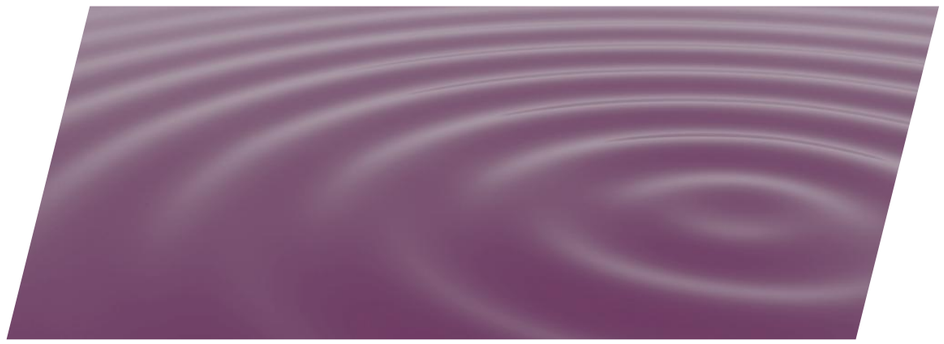
The air-handling units will provide the new operating theatres and their ancillary areas with the required air change rates, as set out in the Hospital Technical Memorandum (HTM) guidelines. The mechanical ventilation systems will be designed to maximise energy efficiency by incorporating low velocity plant and ductwork distribution systems. The systems will be designed to achieve low specific fan powers, low-pressure drops across the plant that will have an additional benefit of minimising the noise breakout for each unit. The air provided in to the spaces will be used to provide the required level of temperature control for each space.

The external condensers are required to provide the heating and cooling provision for the project, which shall be delivered to the space via the air-handling units.

Above Proposed East Elevation of Chandlier Wing

Appendix 1
Noise Survey Report

HILSON MORAN



Noise Survey Report

DATE OF ISSUE: **8 MAY 2015**
REVISION NUMBER: **00**
HM REFERENCE: **19878-01/A/NS01/00**

PROJECT:

Queens Theatre
London

CLIENT:

UCLH Capital Investments
149 Tottenham Court Road
London
W1T 7DN

ONE DISCOVERY PLACE | COLUMBUS DRIVE | GU14 0NZ
FARNBOROUGH | HAMPSHIRE
T: +44 (0)1252 550 500 | F: +44 (0)1252 550 501
www.hilsonmoran.com | info@hilsonmoran.com

HILSON MORAN

PROJECT NAME: **Queens Theatre**
REPORT NAME: **Noise Survey Report**

ISSUE STATUS: **FINAL**
HM REFERENCE: **19878-01/A/NS01/00**

DATE OF ISSUE: **8 MAY 2015**
REVISION NUMBER: **00**

AUTHOR: **SEBASTIAN WOODHAMS**
CHECKER: **MARK BRIGHTWELL**
APPROVER: **MARK BRIGHTWELL**

DOCUMENT HISTORY:

ISSUE	DATE	DETAILS
00	8/5/2015	DOCUMENT ISSUED EXTERNALLY.

Contents

1. Executive Summary

It is proposed to remodel the first and second floors of the National Hospital for Neurology and Neurosurgery (NHNN) and expand the capacity of operating theatres from 4 to 6.

New building services plant will be introduced to the central courtyard of the site on a deck at first floor level, noise from which will be subject to limits specified by the Local Authority as well as to control noise break-in to hospital rooms.

Hilson Moran has therefore an environmental noise survey at the development site, in order to determine prevailing noise levels affecting the site and its surroundings.

The results of the noise survey were considered reasonable, considering the location of the measurement positions and the dominant nearby noise sources.

Based on the results of the noise survey, external plant noise emission limits have been proposed in accordance with the requirements of Camden Council and also considering noise break-in to the hospital rooms. The new building services plant will sit alongside existing plant serving the building, and shall be selected, designed and located so as to comply with the proposed external plant noise limits.

Our assessment indicates, upon introduction of attenuators, the proposed air handling units should meet the proposed plant noise limits.

2. Introduction

It is proposed to remodel the first and second floors of the National Hospital for Neurology and Neurosurgery (NHNN) and expand the capacity of operating theatres from 4 to 6.

New building services plant will be introduced to the central courtyard of the site on a deck at first floor level, noise from which will be subject to limits specified by the Local Authority as well as to control noise break-in to hospital rooms

Hilson Moran has therefore undertaken an environmental noise survey at the existing site, in order to determine prevailing noise levels affecting the site and its surroundings.

The purposes of this report are:

a) To determine prevailing environmental noise levels affecting the site due to nearby noise sources (e.g. road traffic)

b) To determine external plant noise limits as required by Camden Council and also considering noise break-in to the hospital rooms

c) To undertake a plant noise assessment of the proposed plant and detemine mitigation measures necessary to meet the proposed limits

Following this introductory section, a description of the site is given in Section 3. Section 4 gives a description of the environmental noise survey methodology, with the results presented in Section 5, Appendix B and Appendix C. Section 6 presents noise limits for external plant. Finally section 7 presents a plant noise assessment.Appendix A presents an explanation of the acoustic terminology used in this report.

Queens Theatre London
Noise Survey Report

3. Site Description

The proposed site is the National Hospital for Neurology and Neurosurgery in London. The location of the plant is overlooked by a mixture of patient and staff rooms, with patient wards to the west and east.

Figure 3.1 below shows the existing site and its surroundings, with the courtyard highlighted in **green** and the nearest noise sensitive areas highlighted in **red**.

Figure 3.1 Location of Existing Buildings and Surrounding Land Use

4. Survey Methodology

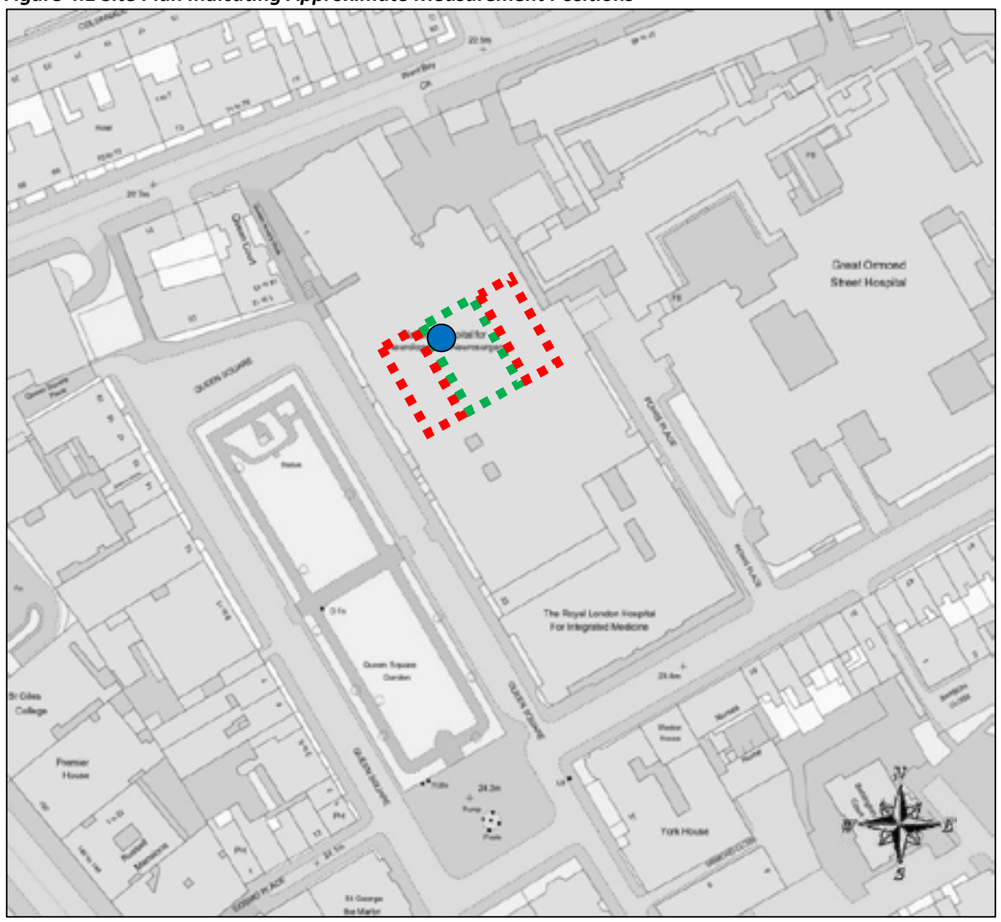
An unmanned environmental noise survey was undertaken at a single measurement location at the proposed site. The noise survey was undertaken between approximately 11:00 hours on Thursday 9 April 2015 and 09:00 hours on Monday 13 April 2015. In addition, manned noise level measurements were undertaken at the site on Thursday 9 April between approximately 10:00 and 11:00 hours.

L_{Amax}, L_{Aeq} and L_{A90} noise levels were measured throughout the unmanned environmental noise survey over contiguous 125 millisecond intervals.

Noise monitoring was undertaken in general accordance with guidance within British Standard (BS) 7445 *'Description and measurement of environmental noise'*.

The unmanned measurement position is shown on Figure 4.1.

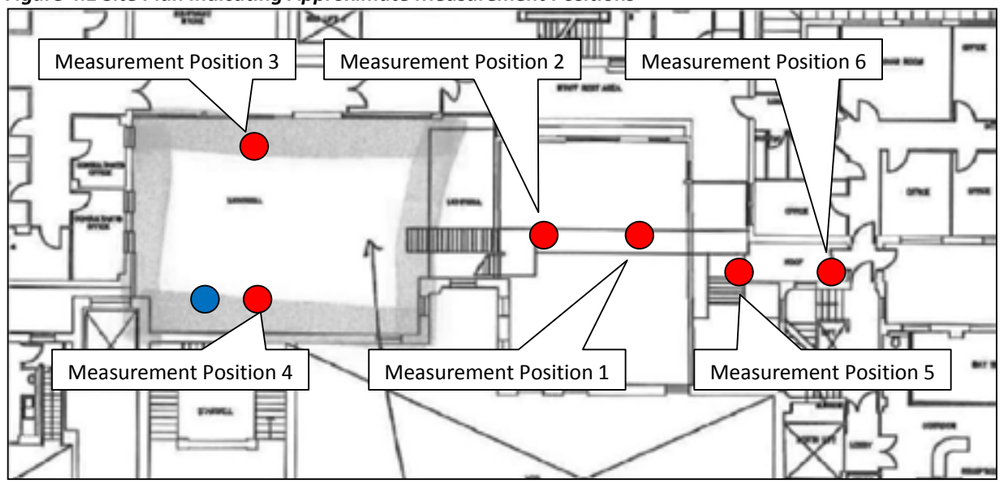
Figure 4.1 Site Plan Indicating Approximate Measurement Positions



The measurement microphone was fixed to a railing on a first floor roof within the courtyard, approximately 3m above ground level. This measurement position is considered representative of the noise levels affecting the nearest noise sensitive receptors.

The manned measurement positions are shown in **red** and the unmanned measurement position is shown in **blue** on Figure 4.2 below.

Figure 4.1 Site Plan Indicating Approximate Measurement Positions



For each manned measurement, the microphone was fixed to a tripod 1.2m above the existing first floor roof.

The equipment used for the noise survey is summarised in Table 4.1 below.

Table 4.1 Description of Equipment used for Noise Survey

Equipment	Description	Quantity	Serial Number
01 dB Solo	Type 1 automated logging sound level meter	1	60447
01 dB PRE 21	Type 1 ½" microphone and pre-amplifier	1	13259
01 dB BAP 21	Outdoor microphone casing	1	10935
01 dB CAL 21	Calibrator	1	50441990

Due to the nature of the unmanned noise survey, i.e. unmanned, we are unable to comment on the weather conditions throughout the entire noise survey period. However, at the beginning and end of the unmanned noise survey period, there was noted to be no rainfall, a cloudy sky and a light wind.

During the manned noise survey there was no rainfall, a cloudy sky and a light wind.

The noise monitoring equipment used was calibrated before and after the noise survey periods. No significant change was found.

Equipment calibration certificates can be provided upon request.

Queens Theatre London
Noise Survey Report

5. Survey Results & Observations

5.1. Results

Appendix B presents time history graphs showing the L_{Amax}, L_{Aeq} and L_{A90} noise levels at the unmanned measurement position, throughout the noise survey period.

We would consider the noise levels measured to be reasonable, considering the location of the measurement positions and the dominant nearby noise sources.

The lowest background $L_{A90,T}$ noise levels measured during daytime and night-time periods at the unmanned position are summarised in Table 5.1 below.

Table 5.1 Lowest Measured Background LA90 Noise Levels (Unmanned Noise Survey)

Lowest Measured $L_{A90,T}$ Background Noise Level (dB)	
Daytime, T = 1 hour (07:00 – 23:00 hours)	**Night-time, T = 15 min (23:00 – 07:00 hours)**
57	56

The background $L_{A90,T}$ noise levels measured at each manned position are summarised in Table 5.2 below.

Table 5.2 Measured Background LA90 Noise Levels (Manned Noise Survey)

Measurement Position	**Measured $L_{A90,T}$ Background Noise Level (dB)**
	Daytime, T = 1 minute
1	72
2	65
3	64
4	61
5	68
6	64

5.2. Observations

Due to the nature of the unmanned survey we are unable to comment on the exact noise climate throughout the entire noise survey period. However, at the beginning and end of the survey period the daytime noise climate at was noted to be dominated by existing plant within the rear courtyard. This was also the case for the manned survey.

6. External Plant Noise Emission Limits

The proposed redevelopment will involve replacing the existing external building services plant with new items of plant, noise from which will be subject to limits specified by Camden Council, in addition we advise consideration be given to noise break-in to hospital rooms.

6.1. Local Authority Requirements

The site lies within the jurisdiction of Camden Council, whose typical requirements are for plant noise to be 5 dBA below the background noise level at the nearest noise sensitive property.

Based on the above, we would propose the plant noise limits shown in Table 6.1, to be achieved during the relevant plant operating period, when measured 1m external to the nearest noise sensitive windows to the site.

Table 6.1 Proposed External Plant Noise Limits – Based on Local Authority Requirements

External Plant Noise Limit during Plant Operating Period $L_{Aeq,T}$ (dB)	
Daytime, T = 1 hour (07:00 – 23:00 hours)	**Night-time, T = 15 min (23:00 – 07:00 hours)**
52	51

The external plant noise limits proposed in Table 6.1 are subject to approval by Camden Council.

6.2. Hospital Internal Noise Level Limits

The nearest noise sensitive facades to the proposed plant location are two consultants' offices to the north, at a distance of approximately 2m from the proposed plant location, and an operating theatre to the north-east, at a distance of approximately 5m from the proposed plant location.

Health Technical Memorandum 08-01: Acoustics (HTM 08), published by the Department of Health, gives criteria for noise intrusion to be met inside the spaces from external noise sources. Table 6.2 below presents the criteria.

Table 6.2 HTM 08 Noise Intrusion Limits

Room Type	**Example**	**Criteria for noise intrusion to be met inside the spaces from external noise sources (dB)**
Small office-type spaces	Private offices, small treatment rooms, interview rooms, consulting rooms	40 $L_{Aeq, 1hr}$
Operating theatres	Operating theatres	40 $L_{Aeq, 1hr}$ 50 $L_{Amax, f}$

From our observations on site, it is understood that windows around the proposed plant area are both single and double glazed.

We advise a well sealed single or double glazed window should provide an outside to inside sound insulation performance of at least 15dB. Therefore provided the noise level of the proposed plant incident upon the windows does not exceed 55dBA, and windows are well sealed and shut, the proposed plant should satisfy the limits presented in Table 6.2 above. Furthermore we note this also indicates the limits presented in Section 6.1 above should also be commensurate with the limits of HTM-08.

7. Plant Noise Assessment

It is proposed to introduce 2No air handling units on a new plant deck to be constructed within the central courtyard.

Table 7.2 below presents the atmospheric side in-duct sound power levels of the proposed air handling units.

Table 7.2 In-Duct Sound Power Levels of Air Moving Plant

Plant Ref	System Description	Location of Grille/Louvre	In-Duct Sound Power Level (dB re 10^{-12} Watts) @ Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
AHU01	Supply	Roof Plant Deck	75	74	75	79	75	74	68	63
AHU01	Extract	Roof Plant Deck	73	74	80	75	73	71	64	55
AHU02	Supply	Roof Plant Deck	75	74	75	79	75	74	68	63
AHU02	Extract	Roof Plant Deck	73	74	80	75	73	71	64	55

We advise that in order to meet the plant noise limits presented in Section 6.1 attenuators would need to be introduced to both the supply and extract paths of each air handling units.

Table 6.3 below presents the minimum insertion losses required of the attenuators

Table 6.3 Atmospheric Plant Noise Attenuator Insertion Losses

System Description	Minimum Attenuator Insertion Loss (dB) @ Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
AHU01 Supply	7	12	20	33	39	40	35	28
AHU01 Extract	7	12	20	33	39	40	35	28
AHU02 Supply	7	12	20	33	39	40	35	28
AHU02 Extract	7	12	20	33	39	40	35	28

We advise that typically would we anticipate the above attenuation could be provided by 1200mm long attenuators with 30% free area.

Table 6.4 below presents a summary of the predicted noise levels due to the proposed air handling units, with attenuators as described in Table 6.3, at the nearest noise sensitive facades to the proposed plant location.

Table 6.4 Plant Noise Calculations – Predicted Levels at Consultants Offices

Plant Item	Approx Distance to Receptor (m)	Predicted Noise Level at Noise Sensitive Property (dBA)
AHU01 Supply	2	37
AHU01 Extract	2	42
AHU02 Supply	2	37
AHU02 Extract	2	42
	Total	**46 dBA**
	Plant Noise Emission Limit	**51 dBA**

APPENDIX A – ACOUSTIC TERMINOLOGY

Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{n,T}$	The noise level exceeded for n% of the time over a given period T. e.g. L_{90}, the noise level exceeded for 90% of the time (background noise level).
L_{max}	The maximum noise level measured.
R_W (dB)	The weighted (w) Sound reduction index (R), a single figure rating of the **laboratory** airborne sound insulation performance of a construction, usually measured across the frequency range 100 – 3150 Hz. The higher the value, the greater the sound insulation provided by the construction.

APPENDIX B – Measured Noise Levels