



**CLIENT: LONDON UNDERGROUND LIMITED**




**CONTRACT REF: TLL 7917**

**NORTHERN LINE EXTENSION**

**MAIN WORKS CONTRACT**

## **Nine Elms Unattended Noise Monitoring**



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## **1 INTRODUCTION**

Ferrovial Laing O'Rourke (FLO) is currently undertaking works as part of the London Underground Extension of the Northern Line (NLE) running from Kennington to Battersea (Charing Cross branch).

Unattended noise monitoring stations have been set up in order to assess construction noise levels of the current activities at the nearest sensitive receptors located around the site boundary.

This report provides a summary of the unattended noise monitoring. The analysed monitoring period spanned hours between Sunday 17<sup>th</sup> September 2017 and Saturday 14<sup>th</sup> October 2017.

## 2 MONITORING PROGRAMME

### 2.1 Receptors

The unattended monitoring positions are representative of the following sensitive receptors:

- Conrad House – Wandsworth Rd (R1)
- Basil House – Wandsworth Rd (R2)
- Adrian House – Wandsworth Rd (R3)
- Charman House – Pascal Street (R4)
- Apple Blossom Court – Pascal Street (R5)
- Bramley Crescent – Pascal Street (R6)

### 2.2 Monitoring Locations

Two monitoring units were installed on Friday 30<sup>th</sup> October 2015. The measurement positions are located within the NLE construction site at a height of approx. 2.9m and are considered to be free field measurements. They are illustrated in the layout plan presented in **Appendix I** and are as follows:

Table 1

MONITORING LOCATIONS		
Location	Coordinates	Representative sensitive receptor
NLE site – (MP1)	530012, 177313	R1, R2, R3, R4
NLE site – (MP2)	529960, 177331	R5, R6

### 2.3 Equipment

The measurement equipment used is detailed in **Table 2**. The measurement system was field calibrated before the start of the unattended monitoring and on-site calibrations are conducted monthly. All the measurement equipment is subject to current certificates of periodic validation traceable to national and international standards. Copies of calibration certificates are available upon request.

Table 2

SURVEY EQUIPMENT				
Manufacture	Item	Type	Serial Number	Dates Monitor Active
Sigicom	Sound Level Meter	INFRA S50	8676	17/09/17 – 03/10/17
Sigicom	Sound Level Meter	INFRA S50	9135	17/09/17 – 03/10/17
Sigicom	Sound Level Meter	INFRA S50	7478	03/10/17 – 14/10/17
Sigicom	Sound Level Meter	INFRA S50	7375	03/10/17 – 14/10/17

### 3 NOISE MONITORING RESULTS

The results of the monthly noise monitoring are presented below in **Table 3** and **Table 4**. The measured noise levels have been corrected in order to predict noise levels from site activities at associated sensitive receptors. In addition, a façade correction which takes into account the reflections from the building façade of 3 dB(A) has been applied to the corrected noise levels.

Table 3

Monthly Noise Levels at R1, R2, R3 & R4				
		L <sub>morn</sub>	L <sub>day</sub>	L <sub>eve</sub>
Sun	17/09/17	-	57.4	-
Mon	18/09/17	64.3	65.1	61.4
Tue	19/09/17	63.9	70.4	60.3
Wed	20/09/17	60.2	63.7	62.7
Thu	21/09/17	58.7	65.2	63.7
Fri	22/09/17	63.3	69.3	60.1
Sat	23/09/17	60.8	71.3	54.8
Sun	24/09/17	-	53.3	-
Mon	25/09/17	64.7	66.0	63.1
Tue	26/09/17	67.6	67.5	59.1
Wed	27/09/17	69.9	68.8	58.5
Thu	28/09/17	68.7	70.3	61.0
Fri	29/09/17	69.0	69.4	70.8
Sat	30/09/17	68.1	70.7	57.5
Sun	01/10/17	-	55.7	-
Mon	02/10/17	69.0	69.2	71.0
Tue	03/10/17	68.3	70.3	73.1
Wed	04/10/17	67.2	70.4	79.7
Thu	05/10/17	65.5	66.8	65.2
Fri	06/10/17	62.4	69.6	60.8
Sat	07/10/17	64.2	68.8	55.1
Sun	08/10/17	-	56.7	-
Mon	09/10/17	63.7	72.0	63.8
Tue	10/10/17	61.7	72.6	79.2
Wed	11/10/17	66.7	71.7	63.5
Thu	12/10/17	67.4	71.0	65.6
Fri	13/10/17	68.6	71.7	69.7
Sat	14/10/17	65.1	72.1	57.1

Table 4

Monthly Noise Levels at R5 & R6				
		L <sub>morn</sub>	L <sub>day</sub>	L <sub>eve</sub>
Sun	17/09/17	-	53.5	-
Mon	18/09/17	63.0	64.5	56.5
Tue	19/09/17	62.0	65.0	56.4
Wed	20/09/17	58.3	61.5	56.1
Thu	21/09/17	58.9	63.0	57.5
Fri	22/09/17	59.2	63.6	60.9
Sat	23/09/17	57.1	64.6	51.7
Sun	24/09/17	-	49.9	-
Mon	25/09/17	60.5	63.3	61.7
Tue	26/09/17	62.8	63.9	63.2
Wed	27/09/17	65.3	65.3	63.5
Thu	28/09/17	63.7	65.4	61.5
Fri	29/09/17	63.8	64.6	60.5
Sat	30/09/17	66.3	65.1	55.8
Sun	01/10/17	-	52.8	-
Mon	02/10/17	66.0	64.0	61.9
Tue	03/10/17	64.5	65.9	63.4
Wed	04/10/17	68.1	66.7	61.9
Thu	05/10/17	64.8	67.2	67.3
Fri	06/10/17	63.0	68.0	60.2
Sat	07/10/17	63.0	68.6	55.1
Sun	08/10/17	-	56.2	-
Mon	09/10/17	67.3	67.1	65.6
Tue	10/10/17	60.9	67.8	65.8
Wed	11/10/17	66.7	68.7	65.0
Thu	12/10/17	68.3	68.8	66.0
Fri	13/10/17	66.7	68.1	63.1
Sat	14/10/17	65.7	65.7	55.7

## 4 TRIGGER RESPONSE LOG

Exceedances above the limits set out in the Noise and Vibration Mitigation Scheme, included as **Appendix II** are identified along with the action taken in **Table 5** below:

Table 5

NOISE TRIGGER LOG					
Date	Receptor	Time period	Noise Level $L_{Aeq,T}$ , dB (exceedance above trigger level)	Cause	Best Practicable Means check
04/10/2017	R1/R2/ R3/R4	Leve	79.7 (+9.7)	Late concrete pour (concrete pump in use plus jet washer)	✓
10/10/2017	R1/R2/ R3/R4	Leve	79.2 (+9.2)	Late concrete pour (concrete pump in use plus jet washer)	✓

Two exceedances occurred during the monitoring period due to the NLE activities.

**APPENDIX I – SITE PLAN**

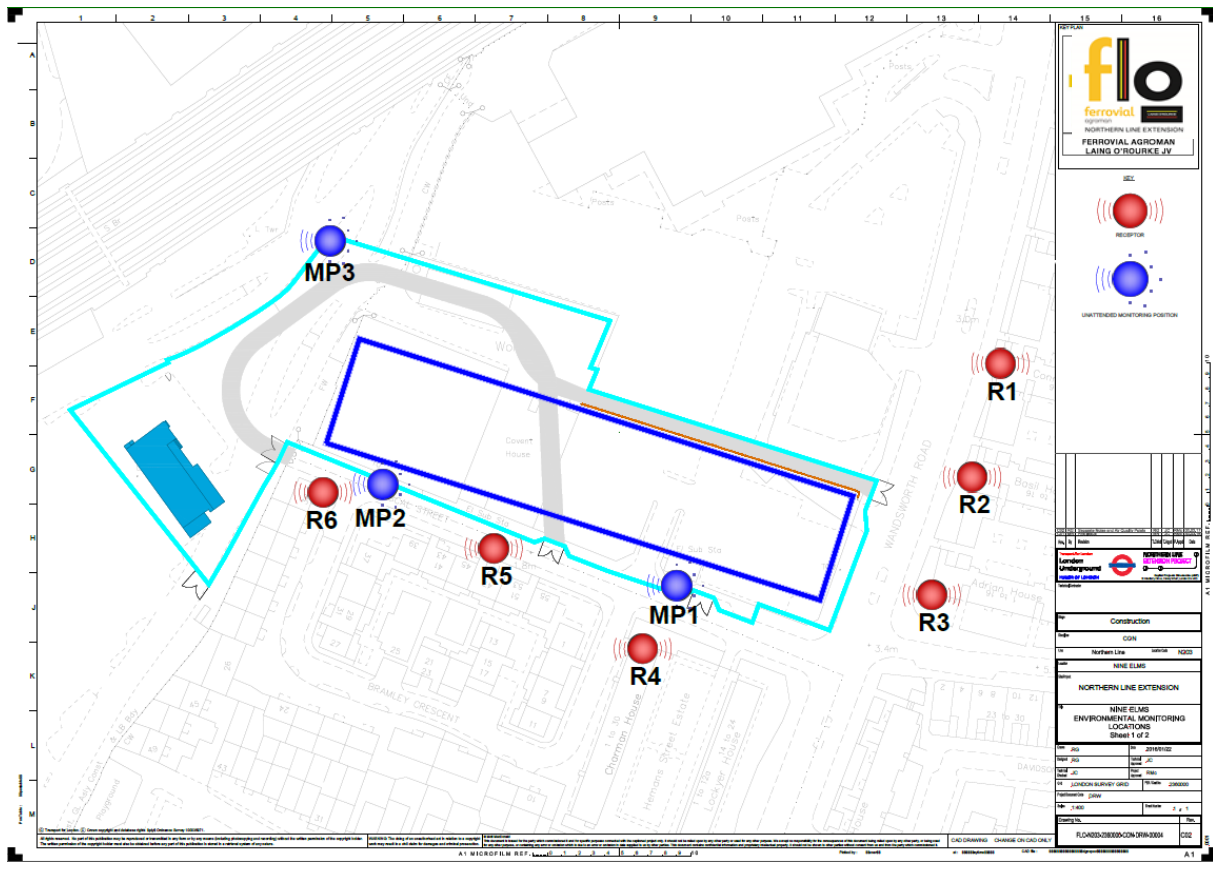


Figure 1 – NLE site plan and sensitive receptor locations



## APPENDIX II – NORTHERN LINE EXTENSION: CONSTRUCTION NOISE AND VIBRATION MITIGATION SCHEME

### Noise Insulation

A dwelling will be eligible for noise insulation where the total noise level due to construction of the railway (pre-existing ambient plus airborne NLE construction noise), measured or predicted at a point one metre in front of the most exposed of any windows and doors in any façade of a building which is an eligible dwelling, exceeds whichever is the higher of either: a) any of the following criteria in **Table 6**.

Table 6

NOISE INSULATION TRIGGER LEVEL TABLE			
Time	Relevant Time Period	Averaging Time Period	Noise Insulation Trigger Level ( $L_{Aeq, \tau}$ ) dB
Monday to Friday	07:00 – 08:00	1 hr	70
	08:00 – 18:00	10 hr	75
	18:00 – 19:00	1 hr	70
	19:00 – 22:00	3 hr	65
	22:00 – 07:00	1 hr	55
Saturday	07:00 – 08:00	1 hr	70
	08:00 – 13:00	5 hr	75
	13:00 – 14:00	1 hr	70
	14:00 – 22:00	3 hr	65
	22:00 – 07:00	1 hr	55
Sunday and Public Holidays	07:00 – 22:00	1 hr	65
	22:00 – 07:00	1 hr	55

Or

(b) 5 dB above the pre-existing airborne noise level for the corresponding times of day (i.e. the Relevant Time Periods presented in column 2 of Table 6);

And

for a period of 10 or more days of working in any 15 consecutive days or for a period of 3 or more nights (22:00-07:00) of working in any 7 consecutive nights or for a total of days exceeding 40 in any six consecutive months.

## APPENDIX III – BASELINE SURVEY

### Attended Survey

Baseline noise measurements were taken in the area surrounding the Nine Elms site in October 2014. Measurement locations and results can be seen below; locations were chosen in order to cover the closest sensitive receptors around the site. Further details related to the exercise are documented in the report 'T2385.1 – Northern Line Extension: Pre-construction Noise and Vibration Baseline Report'.

Table 7

ATTENDED BASELINE RESULTS			
ID	Address	Time Period	Typical $L_{Aeq,T}$ dB
NE1	Bramley Crescent.	Daytime	59.3
		Evening	46.3
		Night-time	42.2
NE2	46 Pascal Street	Daytime	61.4
		Evening	57.7
		Night-time	49.2
NE3	Wandsworth Road	Daytime	71.5
		Evening	62.2
		Night-time	60.1
NE4	Charman House (Pascal Street)	Daytime	63.9
		Evening	55.8
		Night-time	48.3

### Trigger Levels

Trigger levels for each receptor, as stated in the Northern Line Extension: Construction Noise and Vibration Mitigation Scheme (**Appendix II**) are shown in **Table 8** below:

Table 8

TRIGGER LEVELS		
	Core Hours, $L_{Aeq,T}$ dB	$L_{morn}$ and $L_{eve}$ $L_{Aeq,T}$ dB
R1/R2/R3/R4	75.0*	70.0*
R5/R6	75.0*	70.0*

\* based on the NI trigger level from **Table 6**.

## APPENDIX IV – GLOSSARY

Table 9

ABBREVIATIONS	
L <sub>morn</sub>	Morning values from 07:00 to 08:00 Monday to Saturday.
L <sub>day</sub>	Core hours from 08:00 to 18:00 Monday to Friday, 08:00 to 13:00 Saturday. 07:00 to 21:00 on Sunday is included but not considered to be Core hours.
L <sub>eve</sub>	Evening values from 18:00 to 19:00 Monday to Friday and from 13:00 to 14:00 Saturday.
Max LEN	Maximum early night values from 19:00 to 22:00 Monday to Friday, 14:00 to 22:00 Saturday and from 07:00 to 22:00 Sun.
Max LLN	Maximum late night values from 22:00 to 07:00 Monday to Sunday.
Typical LLN	Arithmetic average of the intervals for the late night time period.