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ATKINS
Member of the SNC-Lavalin Group

Project: National Paediatric Hospital

Report Type: Summary of Noise Vibration & Movement Monitoring Results

Period of Monitoring: 31st of December – 11th of February

Introduction

Contained within the project documents for the National Children's Hospital development are requirements for Environmental Monitoring to be completed during construction works. This monitoring regime includes recording dust deposition, noise at the nearest receptor and ground vibration at the nearest receptor. Permissible limits for each monitoring regime have been set out in the Project EIS which was submitted with the Planning Permission for the Hospital.

The number of Monitoring points will vary throughout the project depending on the construction works being undertaken. Locations of monitoring points may change during the course of the works.

Works on site during this monitoring period include, but are not limited to:

- Piling works, Steel works and Excavation of Material from site at O'Reilly Avenue/Energy Centre.
- Pile works and Excavation from site at the hospital entrance.
- Steel works and Excavation of Material from site near Cameron Square.
- Construction of basement level 2 and excavation works at South Circular Road.
- Steel Works near Mount Brown.
- Piling Works, Steel works and Excavation works at Brookfield Clinic.

Vibration Monitoring.

Vibration monitors have been located at the 'closest part of sensitive property' as per the Project Environmental Impact Statement where feasible or alternatively at the site hoarding. The monitors will be located as per the above adjacent to locations where significant works are ongoing on site.

The Project Environmental Impact Statement (EIS) that was part of the project Planning Permission established vibration limit at structures depending on their condition and type. Please see tables below for the limits set.

Table 11.7: Allowable vibration during construction phase for soundly constructed buildings

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	**10 to 50Hz**	**50 to 100Hz (and above)**
15 mm/s	20 mm/s	50 mm/s

Table 11.8: Allowable vibration during construction phase for sensitive buildings

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	**10 to 50Hz**	**50 to 100Hz (and above)**
3 mm/s	3 – 8 mm/s	8 – 10 mm/s

Site operations are monitored using a traffic light trigger system of Green, Amber and Red trigger levels with the Red trigger level set at a vibration limit of 3mm/s PPV which corresponds to the lowest permissible vibration limit for sensitive structures. Any vibration level recorded below Red levels is acceptable within the limits established in Planning.

Number of Monitors on Site:

During the monitoring period summarised for this report (31st December 2018 – 11th February 2019) there were up to 16 active vibration monitors installed at the perimeter of the site.

Location of Vibration and Noise Monitors:

The layout of the monitors is as seen below:

Location of Vibration Monitors

There are concentrations of monitors at the boundaries with Cameron Square and O'Reilly Avenue where works have been ongoing on site in proximity to neighbouring properties.

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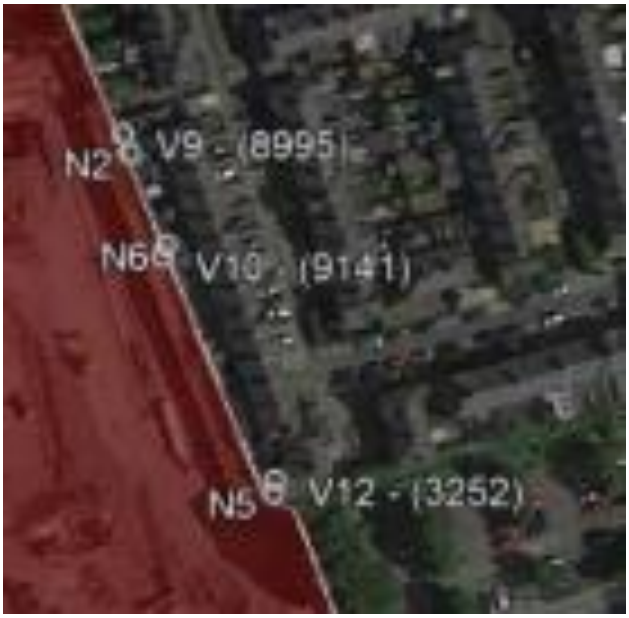

Location of Noise Monitors near O'Reilly Avenue

Observations:

Executive Summary:

Vibration monitors have been placed at the 'closest part of the sensitive properties' as per the EIS where this is feasible. The majority of vibration readings during the monitoring period recorded readings below the limit specified within the Project EIS. Vibration monitors V1, V13, V18, A1 & A2 have been excluded from this report as they are not relevant to the conditions for the residents adjacent to the site. From the remaining 11 monitors:

- 4 number monitors recorded readings above the limit specified within the Project EIS.
- 4 number monitors were offline for portions of the monitoring period and are noted below.

Detailed Summary:

Sensor (V2 – 9750) (James' Walk)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- This sensor experienced communication issues and was offline until the 18th January 2019.

Sensor (V3 – 8838) (South Circular Road)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.

Sensor (V5 – 9155) (Cameron Square)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.

Sensor (V6 - 9736) (Cameron Square)

- Vibrations above the limit specified within the project EIS were recorded for a short period on the following dates: 9th January 2019. The graph shows an isolated peak with values on either side below the limit specified within the project EIS.
- The sensor was offline for a period on the following date: 31st December 2018 (no work occurring on site) and 4th January 2019.
- The vibration report states the cause of these readings was *"an accidental knock".*

Sensor (V7 - 9734) (Old Kilmainham Road)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.

Sensor (V8 - 3485) (Brookfield Clinic)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.

Sensor (V9 – 8995) (O'Reilly Avenue)

- Vibrations above the limit specified within the project EIS were recorded on the following dates: 5th January 2019. The graph shows an isolated peak with values on either side below the limit specified within the project EIS.
- The vibration report states the cause of these readings was *"an accidental knock".*

Sensor (V10 – 8681) (O'Reilly Avenue)

- The sensor was offline on the 14th, 16th, 17th and 18th of January 2019 and on the 23rd of January 2019 and then stayed offline for the remaining timeframe covered in this report. It was sent to the supplier for faults investigation. Other monitors in the area did not have any triggers over this period.
- This sensor was previously name 9141 and changed to 8681.
- The vibration report states the cause of these readings was *"tests applied to unit before installing" or "an accidental knock".*
- A breach was recorded on the 16th and 17th of January 2019 from another sensor (3835) from the same location.

Sensor (V11 – 8983) (O'Reilly Avenue)

- Vibrations above the limit specified within the project EIS were recorded on the following dates: 16th January 2019.
- The vibration report states the cause of these readings was *"an accidental knock".*

Sensor (V12 – 3252) (O'Reilly Avenue)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.

Sensor (V14 - 9737) (Mount Shannon)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- The sensor was offline from the 14th of January 2019 until the 7th of February 2019. Other monitors in the area had no breaches for this period.

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Noise Monitoring.

During the report period noise monitors have been placed at the 'closest part of sensitive property' as per the Project EIS where this has been feasible, or alternatively to the outside face of the site hoarding. When works are ongoing the noise monitor sensors run continuously and readings are recorded in decibels (dB) LA_{eq1hr}. Decibels is the standard unit of measurement of sound energy and 'LA_{eq1hr}' means that sensors record all levels of sound over a 1 hour period and then calculate an average equivalent decibel level as if the sound was continuous. Isolated instantaneous loud noises are thus averaged out.

The Project Environmental Impact Statement (EIS) that was part of the project Planning Permission established a noise limit at residential dwellings of 70dB LA_{eq1hr}. Site operations are monitored using a traffic light trigger system of Green, Amber and Red trigger levels with the Red trigger level set at the noise limit set out in the project EIS (70 dB LA_{eq1hr}.). Any noise level recorded below Red levels is acceptable within the limits established in Planning.

Number of Noise Monitors on Site:

During the monitoring period (31st December 2018 – 11th February 2019) summarised for this report there were up to 16 active monitors at the site boundaries.

Observations:

Executive Summary:

Noise monitors 07, 08, 15 & 16 have been excluded from this report as they are not relevant to the conditions for the residents adjacent to the site. From the remaining 12 monitors:

- 6 number monitors recorded readings above the limit specified within the Project EIS.
- 6 number monitors were offline for portions of the monitoring period and are noted below.

Detailed Summary:

The monitoring results for noise for this period were within the limits set out in the Project EIS with the following exceptions:

Monitor 01 (Cameron Square)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 8th, 11th, 12th, 14th, 15th, 16th, 18th, 21st and 26th of January 2019 and the 3rd, 4th, 5th, 6th and 9th of February 2019.
- The noise report states the cause of these readings was *"Anchoring", "tracked excavator operating in the area", "Excavation Works", "Non-construction related" or "Ambient Traffic".*
- Mitigation Measures included stopping work every hour for 15 minutes and placing green acoustic blankets around herras fencing.
- On the 26th of January 2019 and the 5th of February 2019, there was no works occurring in the area. Breaches occurred outside of working hours.

Monitor 02 (O'Reilly Avenue)

- All noise readings recorded noise levels below the limit specified within the Project EIS.
- The sensor was offline on the following date: 31st of December 2018 and the 2nd, 3rd and 30th of January 2019 and the 9th and 10th of February 2019.

Monitor 03 (Mace)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 2nd, 3rd, 4th, 7th, 8th, 14th, 15th, 16th, 17th, 18th, 21st, 22nd, 23rd, 24th, 25th, 26th, 28th, 29th, 30th and 31st of January 2019 and the 1st, 4th, 5th, 6th, 7th and 8th of February 2019.
- The noise report states the cause of these readings was *"Ambient Traffic".*

Monitor 04 (Mount Brown Road)

- The background noise readings for this sensor outside of construction hours are consistently above the normal limit of 70 dB LA_{eq1hr}. As of 2017 an alternate limit of 80 dB LA_{eq1hr} has been chosen for this location.
- All noise readings recorded noise levels below the alternate limit of 80 dB LA_{eq1hr}.
- The sensor was offline on the following date: 31st of December 2018 and the 1st, 2nd, 3rd,12th, 13th, 14th and 29January 2019.

Monitor 05 (O'Reilly Avenue)

- All noise readings recorded noise levels below the limit specified within the Project EIS.

Monitor 06 (O'Reilly Avenue)

- All noise readings recorded noise levels below the limit specified within the Project EIS.
- The sensor was offline on the following date: 11th, 12th, 13th and 14th of January 2019.

Monitor 09 (86 James' Walk)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 7th, 10th, 12th, 13th, 16th, 19th, 21st, 24th, 26th, 27th and 29th of January 2019 and the 4th, 7th, 8th, 9th and 10th of February 2019.
- The noise report states the cause of these readings was *"Ambient Traffic" or "Delivery to St. James Hospital".*

Monitor 10 (Brookfield Clinic)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 29th and 31st of January 2019.
- The sensor was offline on the following date: 31st of December 2018 and the 1st, 2nd, 4th, 14th, 15th, 24th ,25th, 29th and 31st of January 2019.
- The noise report states the cause of these readings was *"Piling Works".*
- Mitigation Measures included stopping work every hour for 15 minutes and placing green acoustic blankets around herras fencing.

Monitor 11 (Cameron Square)

- All noise readings recorded noise levels below the limit specified within the Project EIS.

Monitor 12 (Cameron Square)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 30th of January 2019 and the 6th, 7th and 8th of February 2019.
- The noise report states the cause of these readings was *"Tracked Excavator operating in the area" or "Excavation Works".*
- Mitigation Measures included placing green acoustic blankets around herras fencing.

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Monitor 13 (O'Reilly Avenue)

- All noise readings recorded noise levels below the limit specified within the Project EIS.
- The sensor was offline on the following date: 31st of December 2018 and the 1st, 2nd, 4th, 11th, 12th, 13th and 14th of January 2019.

Monitor 14 (Mount Shannon Road)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 31st of December 2018 and the 1st, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th and 31st of January 2019 and the 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th of February 2019.
- The sensor was offline of the following dates: 31st December 2018
- The noise report states the cause of these readings was *"Ambient Traffic".*

Observations:

The following sensors were offline for a time period longer than 24 hours.

- Sensor (V10 – 8681) (O'Reilly Avenue) from 6th to 7th January & from the 23rd of January 2019 until the end of the time period covered in this report.
- Sensor (V14 – 9737) (Mount Shannon) from the 14th of January until the 7th of February 2019.
- Monitor 04 (Mount Brown Road) from the 31st December to the 2nd of January 2019.
- Monitor 06 (O'Reilly Avenue) from the 11th, to the 14th of January 2019.
- Monitor 10 (Brookfield Clinic) from the 1st to 2nd of January 2019.
- Monitor 13 (O'Reilly Avenue) from the 11th, to the 14th of January 2019.