

# Memo

**Project:** National Paediatric Hospital

**Report Type:** Summary of Noise Vibration & Movement Monitoring Results

**Period of Monitoring:** 1<sup>st</sup> of October – 29<sup>th</sup> of October

## 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 perimeter of the site, and ground vibration at the perimeter of the site. 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. Additional monitoring points may be added if particular features of adjacent properties require it.

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

- Demolition of old utility tunnel, excavating material from site and pouring capping beam at O’Reilly Avenue/Energy Centre.
- Excavation of materials from site, construction of basement slab and construction of new road at the hospital.
- Steel works for capping beam and excavation of material from site near Cameron Square.
- Construction of basement slab at South Circular Road.
- Construction works on capping beam and tying back of anchors at Mount Brown.

## 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

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**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 (1<sup>st</sup> October 2018 – 29<sup>th</sup> October 2018) there were up to 18 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 & Noise 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 Vibration 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 13 monitors:

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

### Detailed Summary:

#### **Sensor (V2 – 9750) (Rialto Luas)**

- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- The sensor was offline on the following dates: 19<sup>th</sup>, 24<sup>th</sup>, 25<sup>th</sup>, 26<sup>th</sup>, 27<sup>th</sup> and 28<sup>th</sup> October 2018

#### **Sensor (V3 – 8838) (South Circular Road)**

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

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## Sensor (V5 – 9155) (Cameron Square)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- The sensor was offline on the following dates: 2<sup>nd</sup>, 6<sup>th</sup>, 16<sup>th</sup>, 23<sup>rd</sup> and 24<sup>th</sup> October 2018

## Sensor (V6 - 9736) (Cameron Square)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- The sensor was offline on the following dates: 11<sup>th</sup>, 23<sup>rd</sup>, 24<sup>th</sup> October 2018

## Sensor (V7 - 9141) (Old Kilmainham Road)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- The sensor was offline on the following dates: 18<sup>th</sup>, 19<sup>th</sup>, 22<sup>nd</sup> and 25<sup>th</sup> October 2018

## 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: 9<sup>th</sup> October 2018.
- The vibration report states the cause of these readings is “*Unknown*”.

## Sensor (V10 – 8939) (O’Reilly Avenue)

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

## Sensor (V11 – 8983) (O’Reilly Avenue)

- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- The sensor was offline on the following dates: 2<sup>nd</sup>, 10<sup>th</sup> and 16<sup>th</sup> October 2018.

## 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 on the following dates: 2<sup>nd</sup> and 28<sup>th</sup> October 2018

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## **Sensor (V19 - 8681) (McDowell Avenue)**

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

## **Sensor (V20 - 8898) (CRIC's car park)**

- The sensor started recording readings on the 8<sup>th</sup> October 2018.
- All vibration readings recorded vibrations below the limit specified within the Project EIS.
- The sensor was offline on the following dates: 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 28<sup>th</sup> and 29<sup>th</sup> October 2018

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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<sub>eq1hr</sub>. Decibels is the standard unit of measurement of sound energy and ‘LA<sub>eq1hr</sub>’ 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<sub>eq1hr</sub>. 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<sub>eq1hr</sub>). 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 (1<sup>st</sup> October 2018 – 29<sup>th</sup> October 2018) summarised for this report there were up to 18 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 14 monitors:

- 8 number monitors recorded readings above the limit specified within the Project EIS.
- 10 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: 1<sup>st</sup>, 5<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 12<sup>th</sup>, 23<sup>rd</sup> October 2018
- The noise report states the cause of these readings as “*Excavation of Material*”, “*Tracked Excavation in operation*” or “*Steel Works on Capping Beam*”.

#### **Monitor 02 (O’Reilly Avenue)**

- All noise readings recorded noise levels below the limit specified within the Project EIS.
- The sensor was offline of the following dates: 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup>, 25<sup>th</sup>, 26<sup>th</sup> and 28<sup>th</sup> October 2018.

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## Monitor 03 (Mace)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 21<sup>st</sup>, 22<sup>nd</sup>, 23<sup>rd</sup>, 24<sup>th</sup>, 25<sup>th</sup>, 26<sup>th</sup>, 27<sup>th</sup> and 28<sup>th</sup> October 2018
- The noise report states the cause of these readings as “*Ambient Traffic Noise*”.

## 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<sub>eq1hr</sub>. As of 2017 an alternate limit of 80 dB LA<sub>eq1hr</sub> has been chosen for this location.
- All noise readings recorded noise levels below the alternate limit of 80 dB LA<sub>eq1hr</sub>.
- The sensor was offline on the following date: 24<sup>th</sup>, 25<sup>th</sup>, 26<sup>th</sup>, 27<sup>th</sup> and 28<sup>th</sup> October 2018.

## Monitor 05 (O’Reilly Avenue)

- All noise readings recorded noise levels below the limit specified within the Project EIS.
- The sensor was offline of the following dates: 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> October 2018.

## Monitor 06 (O’Reilly Avenue)

- All noise readings recorded noise levels below the limit specified within the Project EIS.
- The sensor was offline of the following dates: 16<sup>th</sup>, 17<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> October 2018.

## Monitor 09 (Rialto LUAS 1<sup>st</sup> – 14<sup>th</sup> James’ Walk 15<sup>th</sup> – 28<sup>th</sup>)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 1<sup>st</sup>, 5<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 16<sup>th</sup>, 17<sup>th</sup>, 20<sup>th</sup>, 21<sup>st</sup>, 23<sup>rd</sup>, 26<sup>th</sup> October 2018. The highest noise recording was 80 dB LA<sub>eq1hr</sub>.
- The sensor was offline of the following dates: 22<sup>nd</sup> October 2018
- The sensor location was moved and started recording at 86 James Walk on the 15<sup>th</sup> October 2018.
- The noise report states the cause of these readings as “*Ambient Luas Noise*”.

## Monitor 10 (Brookfield Clinic)

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

## Monitor 11 (Cameron Square)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 15<sup>th</sup> and 18<sup>th</sup> and 24<sup>th</sup> October 2018.

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- The noise report states the cause of these readings as *“Two Tracked Excavators in Operation”*.

## Monitor 12 (Cameron Square)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 11<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup> and 25<sup>th</sup> October 2018.
- The sensor was offline on the following dates: 1<sup>st</sup>, 8<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup> October 2018.
- The noise report states the cause of these readings as *“Anchoring, Ambient Traffic Noise, Tracked Excavators in operation or Unloading of Delivery Trucks”*.

## Monitor 13 (O’Reilly Avenue)

- All noise readings recorded noise levels below the limit specified within the Project EIS.
- The sensor was offline of the following dates: 15<sup>th</sup>, 17<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 21<sup>st</sup> and 22<sup>nd</sup> October 2018

## Monitor 14 (Mount Shannon Road)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 23<sup>rd</sup>, 24<sup>th</sup>, 25<sup>th</sup>, 26<sup>th</sup>, 27<sup>th</sup> and 28<sup>th</sup> October 2018
- The sensor was offline of the following dates: 10<sup>th</sup>, 11<sup>th</sup>, 15<sup>th</sup>, 17<sup>th</sup>, 19<sup>th</sup>, 21<sup>st</sup>, 22<sup>nd</sup> and 28<sup>th</sup> October 2018.
- The noise report states the cause of these readings as *“Ambient Traffic Noise”*.

## Monitor 17 (1 McDowell Av)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 12<sup>th</sup>, 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 21<sup>st</sup>, 22<sup>nd</sup>, 23<sup>rd</sup> and 27<sup>th</sup> October 2018.
- The sensor was offline of the following dates: 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, 15<sup>th</sup>, 24<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup> October 2018.
- The noise report states the cause of these readings as *“Ambient Traffic Noise or an Unknown Cause”*.

## Monitor 18 (CRIC’s car park)

- Noise levels above the limit specified within the Project EIS were recorded on the following dates: 5<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 22<sup>nd</sup>, 23<sup>rd</sup>, 24<sup>th</sup> and 26<sup>th</sup> October 2018.
- The sensor was offline of the following dates: 3<sup>rd</sup>, 4<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 23<sup>rd</sup>, 24<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup> October 2018.
- The noise report states the cause of these readings as *“Demolition at CRIC Building”*.