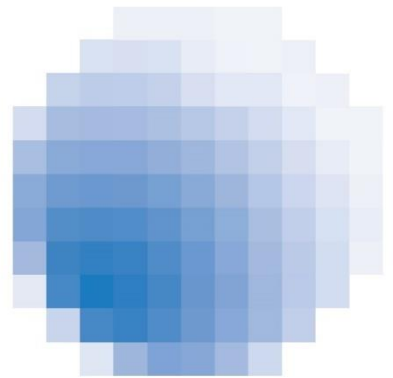




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**The Royal Mint**  
**Llantrisant, Wales**

**Preliminary Environmental Noise Impact Assessment**  
**28 September 2022**

PROJECT: The Royal Mint  
Llantrisant, Wales

CLIENT: Sol Environment Limited  
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## 1 INTRODUCTION

Sol Acoustics Limited (“Sol”) has been commissioned to conduct an environmental noise impact assessment to establish the noise impact resulting to the surrounding environment, as arising from the operation of the existing Royal Mint industrial premises (hereinafter referred to as the “Facility”), which is located in Llantrisant, Wales. The purpose of this acoustic assessment is as follows:

- To identify the nearest noise sensitive receptors (“NSR”) that are most likely to be affected by environmental noise arising from plant and/or processes associated with the Facility.
- To determine the prevailing baseline background noise climate at the worst affected NSR, through direct, environmental noise measurement.
- To identify existing and significant noise sources at the Facility, such as specific fixed plant and machinery.
- To undertake noise level measurements of the site activities at the worst-affected noise sensitive receptors.
- To carry out an environmental noise assessment of the existing Facility in accordance with the methodology prescribed in relevant Standards and guidance (i.e. British Standard BS 4142:2014+A1:2019) to determine the significance of the existing noise impact.

Due to the limitations of the survey and assessment methodology (as explained herein), the findings of this assessment are considered preliminary only.

This acoustic report is structured as follows:

- Section 2 provides a basic description of the Facility and key surrounding NSRs.
- Section 3 provides summary details of the environmental noise survey undertaken in order to determine the baseline environmental noise climate and existing noise impact of the Facility operation at the identified NSRs.
- Section 4 provides the results of the environmental noise survey.
- Section 5 provides a summary of the pertinent acoustic standards, namely BS 4142 as well as Environment Agency guidance, for the assessment of the existing noise impact.
- Section 6 provides the indicative noise impact assessment and next steps.
- Section 7 provides a conclusion statement.
- *Appendix A provides a glossary of acoustic terminology.*
- *Appendix B provides details of the noise surveys undertaken and a summary of the data obtained.*

## 2 DESCRIPTION OF SITE

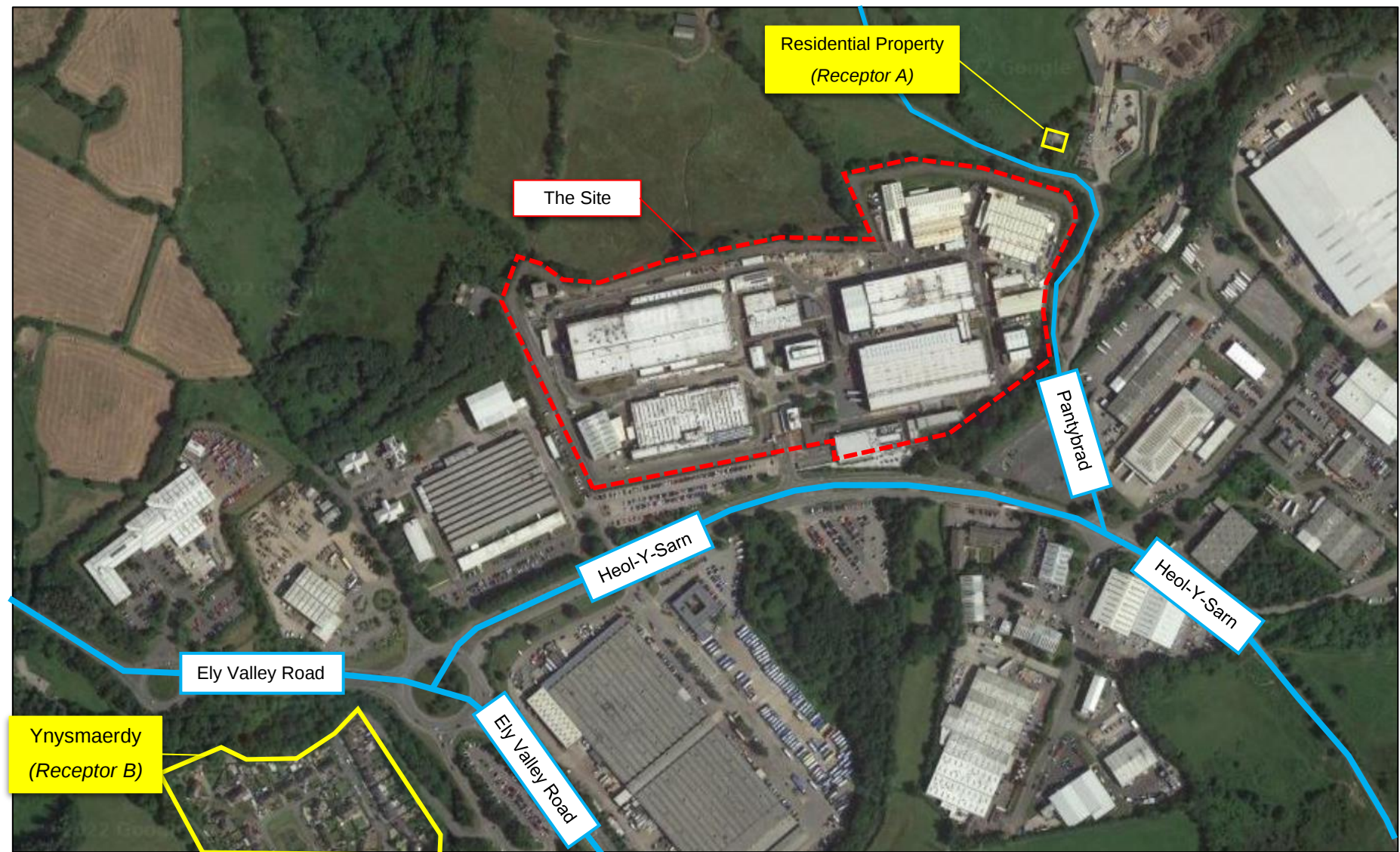
### 2.1 General Site Overview and Noise Sensitive Receptors

The Facility is located on Hoel-Y-Sarn, just off the Ely Valley Road in Llantrisant, Glamorgan, Wales. It is operated by The Royal Mint Limited and produces all UK coinage as well as minting circulating coins on international markets and producing precious metal products.

It is located within the Llantrisant industrial/business area and as such borders with other existing and operational industrial premises to the east, south and west. The nearest identified existing noise sensitive premises to the Facility are as follows:

- Residential housing located approximately 40 metres distance to the north east of the site boundary, as on the opposite (north east) side of Pantybrad ("**Receptor A**")
- The houses in Ynysmaerdy approximately 300 metres distance to the south west of the site boundary on the opposite (south west) side of the Ely Valley Road ("**Receptor B**")

Figure 1 indicates the location of the Facility in relation to the nearest noise sensitive premises.



**Figure 1:** Site, surrounding areas, and noise-sensitive receptors (Google 2022)

## **2.2 Characteristics of the Site Operation**

### **2.2.1 Overview of the Site**

The Facility processes predominantly involve the minting of coins. This involves the processing and plating of various metals as well as imprinting on the coins, a process known as “striking”. As well as these industrial processes themselves there are various plant items serving the processes including (but not limited to) ventilation, cooling, and air-scrubbing plant.

The Facility operates continuously 24-hours per day, 7 days per week. Sol has been informed that there is no significant variation in terms of industrial activity between daytime and night time periods.

The main processing buildings are to the eastern half of the site, with predominantly administrative and storage buildings to the western half of the site (and a visitor centre and car parks to the south).

There is also currently a temporary CHP unit to the west of the site, which Sol understands will be removed at some stage in the future, albeit a specific date for this is yet to be confirmed.

An annotated site plan of the Facility highlighting the principal noise generating plant and processing buildings is shown in Figure 2.

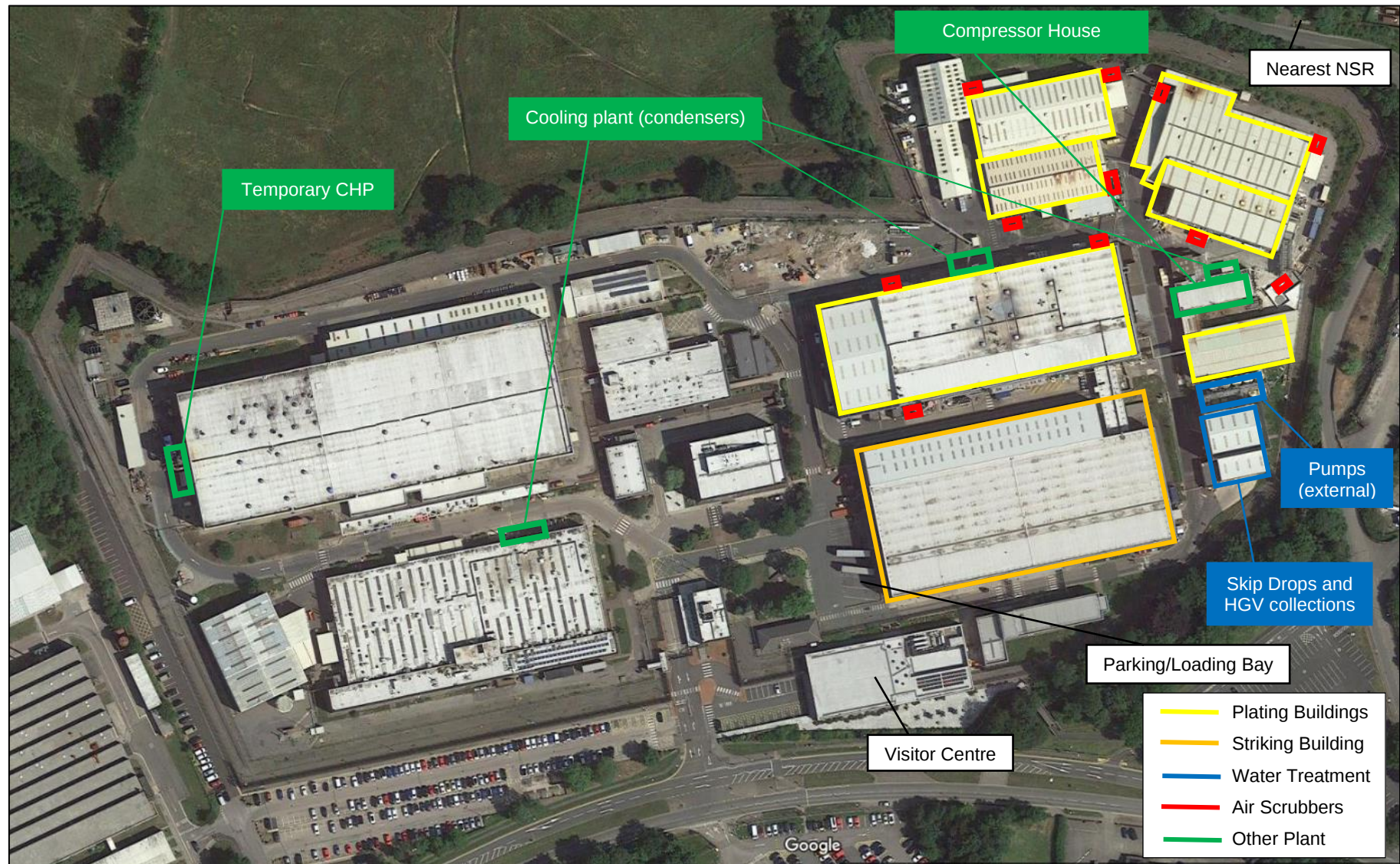
### **2.2.2 Internal Site Operations**

With regards to the processing within buildings, it is understood that this can be split into three principal categories:

- Plating buildings – these are where the coins are formed by “plating”, with each building dedicated to a specific metal. These buildings are served by air scrubbers which clean impurities out of the air before it is discharged to atmosphere.
- Striking buildings – this is the building where the images are imprinted onto the coins.
- Water treatment buildings – this is where the water used within the industrial processes is treated. This involves the filtering of water with all waste product eventually dumped into skips for removal from site. The building is served by external water pumps.

### **2.2.3 External Site Operations**

There are some HGV and other vehicle movements on site. It is understood that HGV movements predominantly comprise the collection of roll-on-roll-off skips from the south of the water treatment buildings, and use of the central loading/parking bay. HGVs enter the site at the main entrance off Heol-Y-Sarn (and thus HGV movements are understood to be generally confined to the south and centre of the site). It is understood that there are no time restrictions with respect to HGV movements nor HGV site access.



**Figure 2:** Site layout with principal noise-generating plant/buildings highlighted (Google 2022)

### 3 DETAILS OF INVESTIGATION

In order to inform this acoustic assessment, an environmental noise survey have been conducted by Sol Acoustics as between 31 August to 2 September 2022. The purpose of the measurements was to determine the noise level emissions generated by the existing plant and processes associated with the Facility, as well as determine representative background and residual sound levels, in the absence of site-generated noise, for assessment purposes in line with BS 4142:2014+A1:2019 ("BS 4142") guidance, insofar as could be practicably achieved at this stage and in preliminary terms.

#### 3.1 Noise Survey Limitations

As per the project brief, there were various limitations presented by the preliminary noise surveys conducted, e.g. as due to the continuous operation of the various plant and other environmental noise sources associated with the Facility which could not be isolated. These limitations are presented below, together with a commentary of the steps taken to undertake the best practicable approach to complete the assessment, in line with BS 4142 guidance.

**NB:** *Due to the below limitations, the presented assessment is considered indicative only (in line with the project brief). In order to assess the environmental noise impact of the existing site operation as a whole with greater certainty, and to determine the specific, likely acoustic significance of individual existing and proposed items of plant associated with the Facility and to develop the required targeted noise mitigation measures, a detailed 3D noise model of the complete Facility shall be essential, as using close-proximity source sound pressure level and sound intensity measurement data.*

##### 3.1.1 Third-party Industrial/Plant Noise

Due to the proximity and nature of the surrounding commercial and industrial site operations it was not possible to measure noise emissions from the Facility in isolation at the nearest NSRs. At this preliminary BS 4142 assessment stage therefore, a subjective assessment approach of environmental noise contribution arising at NSRs from the Facility has therefore been used to inform the assessment, per receptor.

##### 3.1.2 24-hour Site Operation

As the Facility is fully operational on a 24-hours per day, 7-days per week basis, with no opportunities for processing to be shut down temporarily. Accordingly, it was not possible to measure the Background Sound Level or Residual Sound Level (in the absence of site activity noise) at the nearest NSRs. BS 4142 provides the following guidance for such situations:

*'... Measure the background sound at a location which is not subject to the specific sound and where the residual sound is considered to be comparable to that of the assessment location ...'*



Best available alternative proxy measurement locations were selected as based on the above guidance. However, it is duly noted that as measurements weren't taken at the NSR locations, there is the possibility for some variation when compared to the Background and Residual Sound Levels at the NSR, as compared to the measurement position. However, all available steps have been taken to minimise this as far as was reasonably possible and this has been deemed as satisfactory for Sol's preliminary BS 4142 assessment purposes.

## **3.2 Survey Methodology**

### **3.2.1 Background and Residual Sound Level Measurements**

Typical Background and Residual Sound levels expected at the nearest NSRs have been determined based upon the results of a continuous environmental noise survey conducted during the late evening and night time periods.

As discussed in Section 3.1, it was not possible to directly measure the actual Background and Residual Sound Levels at the "Receptor A" location, as due to the continuous influence of noise generated from the Facility (noise from the Facility was clearly audible and significant during night time periods at this receptor location).

Additionally, to the north of the Facility and Receptor A, a solar farm was being constructed at the time of the noise surveys (September 2022) which generated significant extraneous noise during daytime periods. Furthermore, a generator associated with the site which was noted to be running during the night time. (Third party construction noise is obviously temporary in nature and should not be considered representative of the "typical" background or residual environmental noise climate and must therefore be excluded from consideration).

Based on a review of the surrounding area and a subjective assessment it was deemed that the most representative and available location was to the south of the industrial estate just off Hoel-Y-Sarn, on the Llantrisant Common. This location was selected, as it is located at an equivalent distance from the Ely Valley Road, which is the main transportation noise source in the area, and also equivalently peripheral to the wider industrial estate.

A position representative of Receptor B was also selected west of the houses at an equivalent distance to the Ely Valley Road. Noise from the Facility was not distinctly audible at this measurement position.

Measurements were taken continuously between c.20:00 hours during Thursday 1 September through to c.08:00 hours during Friday 2 September 2022.

### **3.2.2 Ambient (Site Noise) Measurements**

In order to ascertain the noise level of site operations at the nearest NSRs, attended noise level measurements and subjective assessments were undertaken at the NSR locations.

Noise level measurements were taken adjacent to Receptor A from c.22:15 hours during 31 August 2022 and 08:30 hours during 1 September 2022.

A subjective assessment was undertaken at the Receptor B location which indicated that noise arising from the Facility was not distinctly audible, including during sustained lulls in road traffic during the late night period (c.01:00 hours). It was therefore not deemed possible to determine the Ambient Sound Level of the site operation at these NSRs through direct, empirical measurement.

It is understood that the Facility was fully operational throughout the survey period, including so-called “tank discharge” events within the water treatment building (which have potentially elevated noise output) which were recorded to have occurred.

### 3.2.3 Measurement Positions

The environmental noise survey consisted of three separate fixed continuous noise monitoring positions as described in Table 1 below and shown on Figure 3:

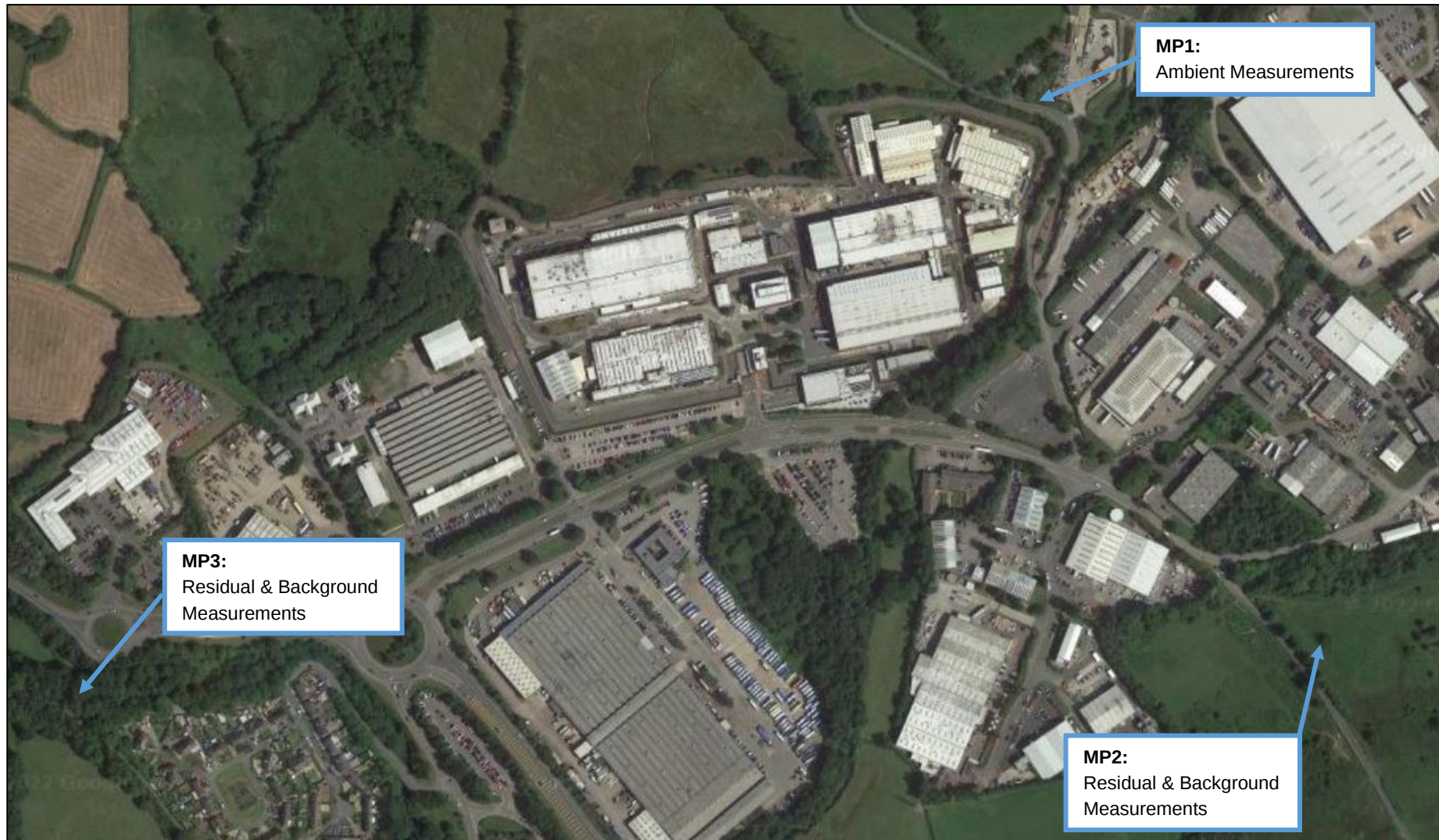
| Measurement Position                                                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MP1</b><br><i>Ambient noise levels at nearest NSR</i>                            | <p>The microphone was tripod-mounted and located adjacent to the entrance to the residential property on Pantybrad, sited c.21 metres distance from the outer boundary of the Royal Mint site. The microphone was c.1.5 metres above ground level and in “free-field” conditions.</p> <p>The soundscape at the microphone position was dominated by industrial/plant noise from the Royal Mint site, as well as some noise contribution from other surrounding industrial sites including the Llantrisant Recycling Centre to the north as well as vehicle drive-bys on Pantybrad and the wider road network.</p> <p>Audio was recorded by the sound level meter throughout the survey in order to identify any extraneous noise during unattended periods.</p> |
| <b>MP2</b><br><i>Background sound levels representative of nearest NSR</i>          | <p>The microphone was tripod-mounted and located to the south of the industrial estate and sited c.30 metres distance from Heol-Y-Sarn. The microphone was c.1.5 metres above ground level and in “free-field” conditions.</p> <p>The soundscape at the microphone position was dominated by industrial/plant noise from the wider industrial site, as well as road traffic noise from vehicle drive-bys on Heol-Y-Sarn and the wider road network.</p>                                                                                                                                                                                                                                                                                                         |
| <b>MP3</b><br><i>Background sound levels representative of houses at Ynysmaerdy</i> | <p>The microphone was tripod-mounted and located north-west of the houses that form Ynysmaerdy and sited c.45 metres distance from the Ely Valley Road. The microphone was c.1.5 metres above ground level and in “free-field” conditions.</p> <p>The soundscape at the microphone position was dominated by road traffic noise from the Ely Valley Road with some contribution from industrial noise from the wider industrial area during lulls in traffic.</p>                                                                                                                                                                                                                                                                                               |

**Table 1:** Noise survey measurement positions



All noise monitoring equipment was Type 1 Precision Grade, and the complete measuring systems were field calibrated immediately prior to and following the noise survey period. (Full details of the noise monitoring systems are retained on file by Sol, including traceable calibration records; these are available for review if needed).

Weather conditions were noted to be patchy clouds with light winds at the start and end of the survey periods. Recorded weather data ([www.wunderground.com](http://www.wunderground.com)) states that there was no rainfall during the survey. Notwithstanding the weather conditions, the microphone systems were entirely weatherproofed and fitted with all-weather environmental windshields and bird spikes.



**Figure 3:** Plan showing noise survey measurement positions (Google 2022)

## 4 NOISE SURVEY RESULTS SUMMARY

### 4.1 Background Noise Climate

The results of the continuous unattended environmental noise measurements at Measurement Positions MP2 and MP3 have been used to determine the prevailing Background Sound Level as at the existing residential premises to the north east of the site on Pantybrad (Receptor A), and the houses at Ynysmaerdy (Receptor B).

Table 2 provides a basic summary of the typical overall, A-weighted noise levels measured at Positions MP2 and MP3, in  $L_{Aeq}$  and  $L_{A90}$  terms, as during daytime and night time periods. The specific, measured noise levels pertinent to the required BS 4142: 2014+A1: 2019 environmental noise assessment are highlighted in **bold, italic** text:

| Measurement Position                              | Daytime (20:00 – 23:00) |                              | Night Time (23:00 – 07:00) |                              |
|---------------------------------------------------|-------------------------|------------------------------|----------------------------|------------------------------|
|                                                   | dB, $L_{Aeq,T}$         | dB $L_{A90,15min}$ (Typical) | dB, $L_{Aeq,T}$            | dB $L_{A90,15min}$ (Typical) |
| <b>MP2</b><br><i>Representative of Receptor A</i> | 48                      | 42                           | 48                         | <b><i>40</i></b>             |
| <b>MP3</b><br><i>Representative of Receptor B</i> | 50                      | 47                           | 49                         | <b><i>41</i></b>             |

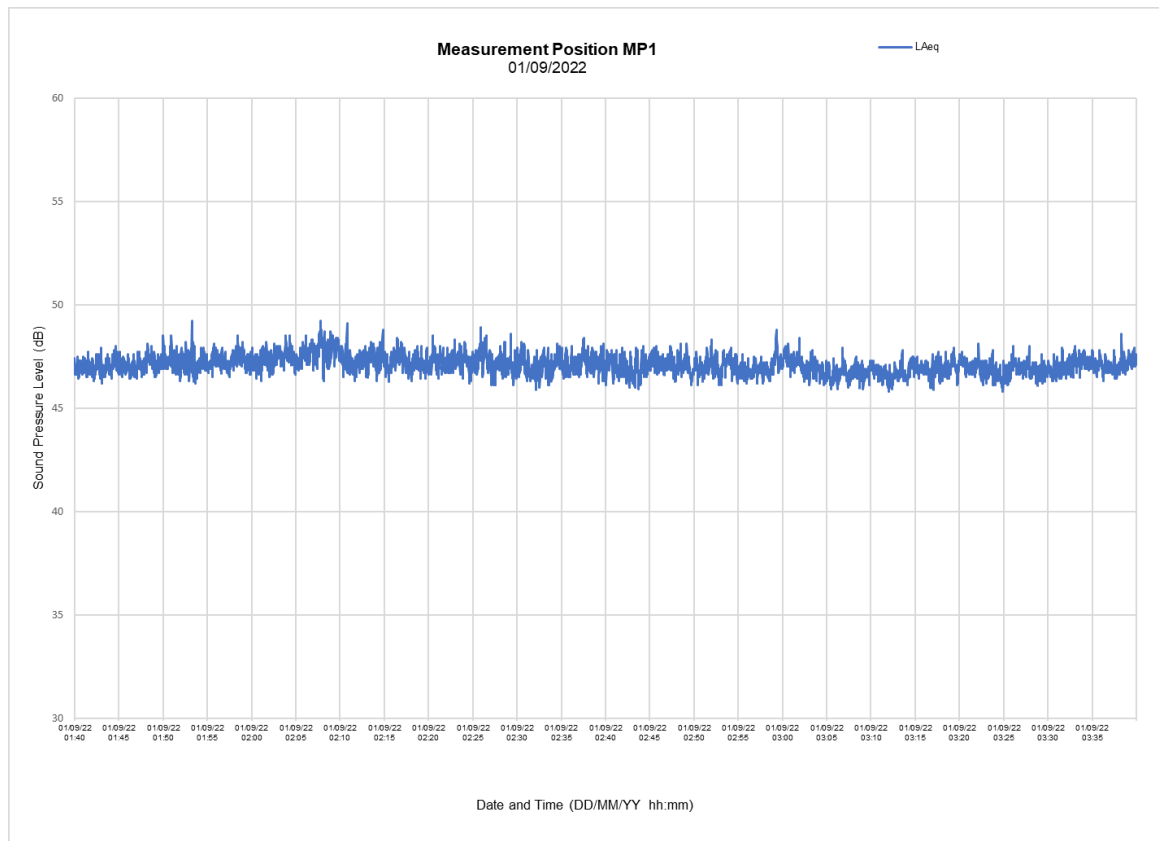
**Table 2:** Summary of measured environmental noise levels at Positions MP2 and MP3

### 4.2 Ambient Sound Level Measurements

The results of the environmental noise measurements at Position MP1 have been used to determine the Ambient Sound Level at the existing residential premises (Receptor A), with the Facility operating normally throughout. The adopted Ambient Sound Level has been based on a representative survey period during the night, as measured in the absence of vehicle drive-bys and any short term/temporary third-party industrial noise, or other extraneous noise events between c.01:40 hours and c.03:40 hours. The results are tabulated in Table 3 and shown in graphical format within Figure 4:

| Measurement Position                | Start Time | Duration | dB, $L_{Aeq,2 hrs}$ |
|-------------------------------------|------------|----------|---------------------|
| <b>MP1</b><br><i>At nearest NSR</i> | 01:40 hrs  | 2 hrs    | 47                  |

**Table 3:** Ambient Noise Level as measured at Measurement Position MP1



**Figure 4:** Graph showing measured Ambient Sound Level ( $L_{Aeq,1s}$ ) at Measurement Position MP1

### 4.3 Residual Sound Level Measurements

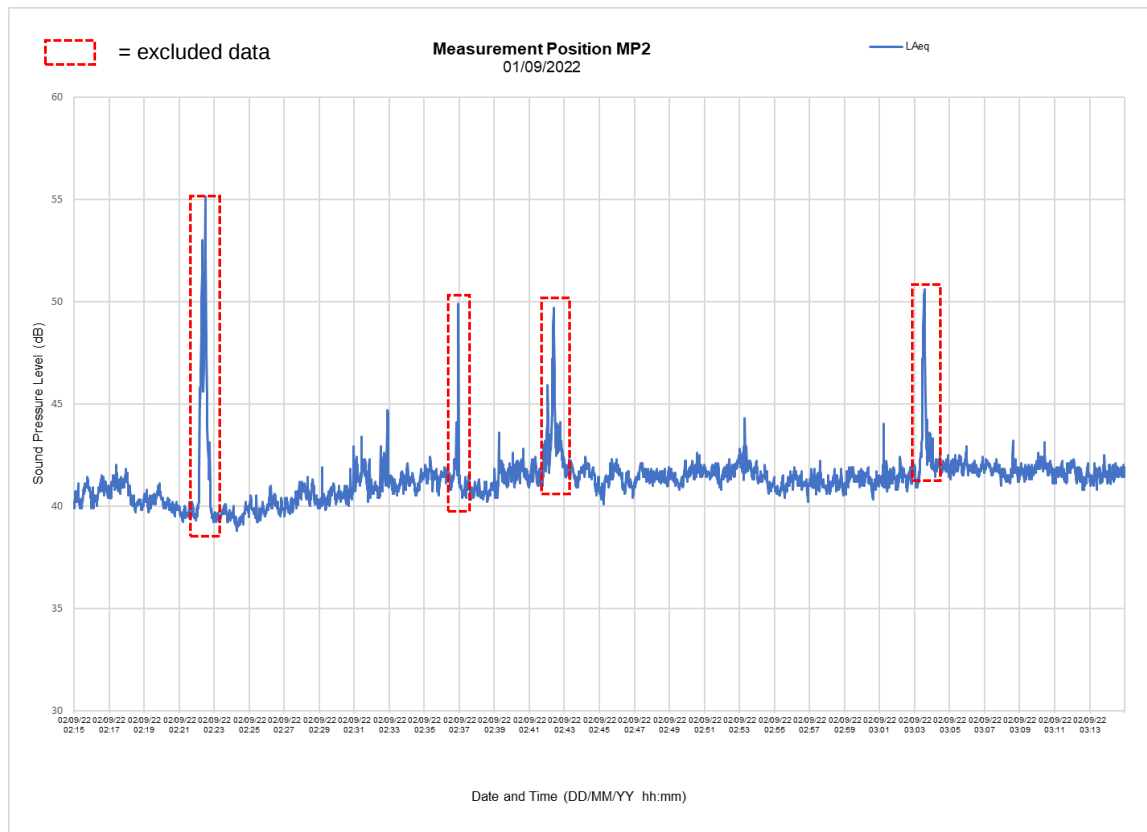
The results of the environmental noise measurements at Position MP2 have been used to determine the Residual Noise Level at a position representative of Receptor A, (i.e. without noise contribution from the Facility). The noise measurement data obtained between c.02:15 hours and c.03:15 hours has been used, as only occasional vehicle drive-bys occurred at this time. The results are tabulated in Table 4 and shown in graphical format by Figure 5:

| Measurement Position | Start Time | Duration | dB, $L_{Aeq,1hr}$ |
|----------------------|------------|----------|-------------------|
| MP2                  | 02:15 hrs  | 1 hr     | 41                |

**Table 4:** Residual Noise Level as measured at Measurement Position MP2



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**Figure 5:** Graph showing measured Residual Sound Level ( $L_{Aeq,1s}$ ) at Measurement Position MP2

## 5 ASSESSMENT CRITERIA

### 5.1 BS4142 Assessment Methodology

BS 4142: 2014+A1: 2019: *'Method for rating and assessing industrial and commercial sound'* is intended to be used to assess noise of an industrial nature, which includes sound from fixed installations comprising of mechanical and/or electrical plant and equipment. The methods prescribed in this British Standard use outdoor sound levels in order to assess the likely effects of sound on people who might be inside or outside a dwelling or premises that is used for residential purposes upon which sound is incident.

The procedure contained in BS 4142: 2014+A1: 2019 for assessing environmental noise impact is to compare the measured or predicted noise level from the source in question - the "Specific Sound Level" immediately outside the noise sensitive premises - with the corresponding "Background Sound Level". Where the noise contains attention attracting characteristics such as tonal, impulsive and/or intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level in order to obtain the "Rating Level."

BS 4142: 2014+A1: 2019 states that the significance of sound arising from an industrial and/or commercial nature depends upon both the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, and also the context in which the sound occurs:

- a) Typically, the greater this difference, the greater the magnitude of the impact
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context
- d) The lower the Rating Level is relative to the measured Background Sound Level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the Rating Level does not exceed the Background Sound Level, this is an indication of the specific sound source having a low impact, depending on the context

For the daytime, the assessment is conducted over a one-hour period, and over a 15-minute period at night. The daytime and night time periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.

## 5.2 Guidance on Noise and vibration Management: Environmental Permits

This guidance is as published by the Environment Agency, Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW) and Northern Ireland Environment Agency (collectively referred to as the “Environment Agencies”) during 23 July 2021, and subsequently updated 31 January 2022. This guidance sets out the minimum requirements for environmental noise and vibration impact assessments, as required to support a Permit Application. It replaces the Environment Agency’s previous Horizontal Guidance for Noise (H3), Parts 1 and 2. The key requirements of the guidance, which are applicable to this assessment, are as presented below:

- The environmental noise impact assessment must be undertaken in accordance with British Standard BS4142: 2014+A1: 2019: ‘*Method for rating and assessing industrial and commercial sound*’.
- The acoustic character of the sound generated must be considered. This must consider whether the sound is tonal, impulsive, or intermittent in operation. For industrial noise sources where the sound is neither impulsive nor tonal, but is readily distinguishable against the residual acoustic environment, **the Environment Agency will expect a minimum acoustic character correction of +3dB** unless otherwise justified.
- The BS4142 defined Background Sound Levels and Residual Sound Levels as used to inform the assessment must not include noise from the Facility. The Facility must not be operational during the environmental noise level measurements.

## 6 PRELIMINARY NOISE IMPACT ASSESSMENT

The noise impact from the Facility has been determined based upon the results of directly obtained noise data, observations made during attended noise measurements, and subjective assessments at various locations around the site and at the worst affected NSRs.

### 6.1 BS4142 Noise Impact Assessment at Receptor A

#### 6.1.1 Specific Sound Level

Table 5 presents the calculated Specific Sound Level based on the measured Ambient Sound Level at Receptor A, the measured Residual Sound Level (with limitations as noted in Section 3.1.2) as presented in Table 3 and Table 4:

| Measured Ambient Sound Level, dB $L_{Aeq,T}$ | Measured Residual Sound Level, dB $L_{Aeq,T}$ | Resultant Specific Sound Level, dB $L_{Aeq,T}$ |
|----------------------------------------------|-----------------------------------------------|------------------------------------------------|
| 47                                           | 41                                            | 46                                             |

**Table 5:** Residual Noise Level as measured at Measurement Position MP2

#### 6.1.2 Subjective Assessment of Acoustic Characteristics

In terms of a subjective assessment of the Facility noise characteristics, the noise arising from the Facility was deemed to be likely principally originating from the scrubbers and ventilation plant. However, it is not possible to subjectively distinguish noise from exact individual plant items within the Facility. Notwithstanding, the noise originating from the Facility was clearly audible at the premises boundary and the characteristics of this noise was noted to be continuous, “broadband” in nature (i.e. with no perceptible tonal element) and was not noted to be impulsive.

On this basis, it is considered that a **+3dB rating penalty correction** should be applied due to the audibility of the Facility at the NSR in line with Environment Agency guidance ‘Noise and Vibration Management: Environmental Permits’ (January 2022).

#### 6.1.3 BS4142 Noise Impact Assessment at Receptor

Table 6 presents the empirically derived, BS4142-defined noise *Rating Level*, as measured at Receptor A and as compared to the measured Background Sound Level:

| Resultant Specific Sound Level, dB $L_{Aeq,T}$ | Acoustic Character Correction | Rating Level, dB $L_{Ar,Tr}$ | Typical Background Sound Level, dB $L_{A90,15min}$ | Rating Level sub. Background, ±dB |
|------------------------------------------------|-------------------------------|------------------------------|----------------------------------------------------|-----------------------------------|
| 46                                             | +3dB                          | 49                           | 40                                                 | <b>+9dB</b>                       |

**Table 6:** Indicative BS 4142 noise level impact at receptor A

Table 6 shows that the empirically derived but *indicative* noise Rating Level for the Facility, as during a typical operation during night time periods, exceeds the typical night time Background Sound Level at the nearest NSR by +9dB.

**In accordance with BS 4142:2014, this is an indication of the Specific sound source (i.e. Royal Mint plant as operating) having an “adverse impact, depending on the context”, albeit just 1dB below the threshold for a “significant impact, depending on the context”.**

#### 6.1.4 *Subjective Impact of Noise Impact*

Due to the limitations of the assessment as discussed in Section 3.1, the subjective assessment of noise emissions from the Facility has greater importance with regard to substantiating the findings of the empirical BS 4142 noise impact assessment.

A subjective assessment of the noise impact of the Facility at the nearest NSR was undertaken during the night time (between c.22:00 and c.01:00 hours), during which it was noted that plant noise originating from the Facility was clearly audible at the boundary of the residential premises.

It was noted that noise arising from the Facility impacting the NSR was deemed to be likely originating principally from the scrubbers and ventilation plant. Other industrial noise from the Facility i.e. from internal activities, arising from the water processing building operation (including external pumps), vehicle movements on site or other industrial site activity, was not noted to be audible during the survey, albeit the acoustic significance of these (most especially in cumulative terms) cannot be ruled out until a 3D computer noise model of the Facility is constructed.

**Notwithstanding, this is a good, early indication that the plant noise from the site well exceeds the prevailing typical Background Sound Level during night time periods and is thus assessed as between adverse and significantly adverse impact, subject to context.**

#### 6.1.5 *Context*

The predicted magnitude of the impact is subject to the consideration of context. In this case, the Facility is situated within an industrial area. Noise from the Facility is therefore within the context of its surrounding environment. In this case and taking the magnitude of the Specific Sound Level in absolute terms (46dB  $L_{Aeq}$ ), the context in which the sound occurs does not affect the outcome of the assessment.

#### 6.1.6 *Uncertainty*

Due to the limitations as presented in Section 3.1 it should be noted that Background and Residual Sound Level measurements were not taken at the NSR location. There is therefore the potential for variation between the measured Background and Residual Sound Levels as compared to “true” levels at the NSR location, which could not be directly measured.

## 6.2 Noise Impact Assessment at Receptor 2

As stated previously, noise from the Facility was not subjectively distinguishable at Receptor 2 and furthermore it was therefore not possible to empirically derive a Rating Level at this receptor location as for noise arising from the Facility.

This *may* be considered an indication that noise from the Facility operation is not likely to be significantly impacting on this NSR, particularly given the context of the receptor's location, with numerous nearby industrial sites and significant road traffic noise from a principal highway. However, further work - including close-proximity source measurements and a detailed 3D environmental noise model - shall be required.

## 6.3 Required Next Steps

Given the findings of this preliminary acoustic assessment and its stated, it is necessary to further mitigate the environmental noise impact of the site. However, this initial assessment is not suitable as basis for identifying plant and processes requiring noise control, nor specifying any acoustic mitigation that is required, nor for isolating the likely individual noise impact and contribution of specific past and present production lines and processes etc. as highlighted by the draft Natural Resources Wales ("NRW") Variation Notice. (The latter in particular can only be done via detailed acoustic modelling of the site, which is also necessary for the purposes of establishing correctly targeted noise control measures).

Specifically, the following is now required:

- Undertake on-site noise level measurements of all key noise generating plant and industrial processes, with all plant run manually "to hand" and thereby operating at maximum operational/design duty.
- Generate a 3D environmental noise model of the Facility to quantify the individual noise contribution from all discrete noise sources as operation at the Facility at the NSRs, thereby determining a ranked list of individual, most significant noise sources (past and present for NRW purposes also), and thereby allow targeted, value-engineered noise control programme to be developed.
- Where possible, undertake further Background Sound Level measurements at the NSR locations when the Facility not in operation (i.e. during shutdown, maintenance etc.) to allow for more reliable Background and Residual Sound Level measurements to be obtained.

## 7 CONCLUSION

Sol Acoustics has been commissioned to conduct a preliminary environmental noise assessment to establish the noise impact resulting to the surrounding environment, as arising from the operation of the Royal Mint, Llantrisant, Wales.

In order to inform the assessment, an environmental noise survey and subjective assessment have been conducted by Sol between 31 August and 2 September 2022. The purpose of these measurements was to determine the noise level emissions generated by the existing plant and processes associated with the Facility, as well as representative Background and Residual Sound levels.

The noise impact from the Facility has been determined based upon the measured results directly obtained, as well as observations made during the attended survey noise measurements and a subjective assessment of the noise impact, per noise sensitive residential housing receptor location (NSR).

***This preliminary, indicative assessment has shown that based upon the 24-hour site operation, the noise Rating Level from the application site exceeds the night time background noise level by c.+9dB at the nearest residential premises. In accordance with BS4142: 2014, this is an indication of between an adverse and significant [noise] impact, depending on the context.***

Furthermore, a subjective assessment of the noise arising from the site deemed that noise from the Facility, in particular from air scrubbers and ventilation plant, was distinctly audible at the nearest residential premises. This is a further positive indication of an adverse noise impact arising from the normal operation of the Royal Mint site.

It was not possible to determine a predicted BS 4142 Rating Level at other noise sensitive receptors at a greater distance from the Facility at this preliminary assessment stage, noise originating specifically from Royal Mint site was not specifically distinguishable (but cannot be ruled out). This important aspect will require further assessment via the provision of a 3D computer environmental noise model of the complete Royal Mint site, such that the acoustic significance of the site as a collective, as well as from individual plant and processes, can be duly assessed in a robust manner.

The provision of a 3D computer noise model of the Royal Mint site is also required for the purposes of identifying appropriate, cost-limited and value engineered noise control measures (which are required), and also for the purposes of addressing specific Natural Resources Wales (NRW) concerns as regards the assessed historic acoustic impact of the Royal Mint site in terms of past and present plant, production lines *et al.*



Specifically, the following further steps are now required:

- Undertake on-site noise level measurements of all key noise generating plant and industrial processes, with all plant run manually “to hand” and thereby operating at maximum operational/design duty.
- Generate a 3D environmental noise model of the Facility to quantify the individual noise contribution from all discrete noise sources as operation at the Facility at the NSRs, thereby determining a ranked list of individual, most significant noise sources (past and present for NRW purposes also), and thereby allow targeted, value-engineered noise control programme to be developed.
- Where possible, undertake further Background Sound Level measurements at the NSR locations when the Facility not in operation (i.e. during shutdown, maintenance etc.) to allow for more reliable Background and Residual Sound Level measurements to be obtained.



## APPENDIX A

### GLOSSARY OF ACOUSTIC TERMS

| Term                              | Abbreviation            | Description                                                                                                                                                                                                                                              |
|-----------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Decibel                           | dB                      | A scale for comparing the ratios of two quantities, including sound pressure and sound power.                                                                                                                                                            |
| A-weighting                       | dB(A)                   | The unit of sound level, weighted according to the A-scale, which takes into account the change in sensitivity of the human ear at varying frequencies.                                                                                                  |
| Sound Pressure Level              | $L_{pA}$                | A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to $2 \times 10^{-5}$ Pascals.                                                                                                                         |
| Equivalent Continuous Sound Level | $L_{Aeq,T}$             | The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.                                                               |
| Statistical Sound Levels          | $L_{A10}$ and $L_{A90}$ | The level of noise exceeded for a percentage of the time period being sampled, namely 10% or 90% respectively.                                                                                                                                           |
| Background Sound Level            | $L_{A90,T}$             | The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of the time period being sampled.                                                                                                          |
| Maximum Sound Level               | $L_{Amax}$              | The maximum sound or noise level determined with instrumentation set to either a fast time weighting, $L_{AFmax}$ , or a slow time weighting, $L_{ASmax}$ , as occurring during the time period being sampled.                                           |
| Sound Power Level                 | $L_{WA}$                | A measure of the total sound energy radiated from a source. Like sound pressure levels, this is also expressed in dB(A) terms, but it is referenced to $1 \times 10^{-12}$ W.                                                                            |
| Broadband                         |                         | Sound sampled over a wide range of frequencies.                                                                                                                                                                                                          |
| Narrow band                       |                         | Sound sampled over a specific, restricted frequency range. Used to ascertain the amplitude and significant of individual, audible tones, and to assist in identifying particular sources of noise within a complex, multi-source soundscape environment. |
| Ambient Sound                     | $L_{eq,T}$              | Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far.                                                                                                                         |
| Specific Sound Level              | $L_{eq,T}$              | The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given reference time interval, $T_r$                                                                                                      |
| Rating Level                      | $L_{Ar,T_r}$            | The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.).                                                                                                                     |
| Residual Noise                    | $L_{Aeq,T}$             | The ambient sound remaining at given position in a given situation, when the specific sound source is suppressed to such an extent that it no longer contributes to the ambient sound.                                                                   |
| Sound Reduction Index             | <i>SRI</i>              | The reduction in sound energy when transmitted through a panel or similar planar element, typically used in relation to single octave or one-third octave frequency band values.                                                                         |



## APPENDIX B

### NOISE SURVEY AND SUMMARY RESULTS

#### LOCATION

Llantrisant, Wales

#### WEATHER CONDITIONS

source - <https://www.wunderground.com/>

| Date       | Daytime<br>(07:00 hours – 23:00 Hours) |            |                |                                   | Night Time<br>(23:00 hours – 07:00 hours) |            |                |                                   |
|------------|----------------------------------------|------------|----------------|-----------------------------------|-------------------------------------------|------------|----------------|-----------------------------------|
|            | Temp, °C                               | Rain, mm/h | Wind Direction | Mean Wind Speed, ms <sup>-1</sup> | Temp, °C                                  | Rain, mm/h | Wind Direction | Mean Wind Speed, ms <sup>-1</sup> |
| 31/08/2022 | N/A                                    |            |                |                                   | 15                                        | 0          | SW             | 5                                 |
| 01/09/2022 | 19                                     | 0          | SW             | 5                                 | 16                                        | 0          | SW             | 4                                 |
| 02/09/2022 | 18                                     | 0          | SW             | 4                                 | N/A                                       |            |                |                                   |

#### PERSONNEL PRESENT DURING MEASUREMENTS

Jamie Ross MIOA – Sol Acoustics

Steffan Davies MIOA – Sol Acoustics

#### INSTRUMENTATION

01dB Cube Sound level meter (serial no. 11117)

01dB Pre22 Microphone preamplifier (serial no. 1610404)

GRAS 40CD Microphone capsule (serial no. 260827)

01dB Cube Sound level meter (Serial no. 11228)

01dB Pre22 Microphone preamplifier (serial no. 1610782)

GRAS 40CD Microphone capsule (serial no. 287832)

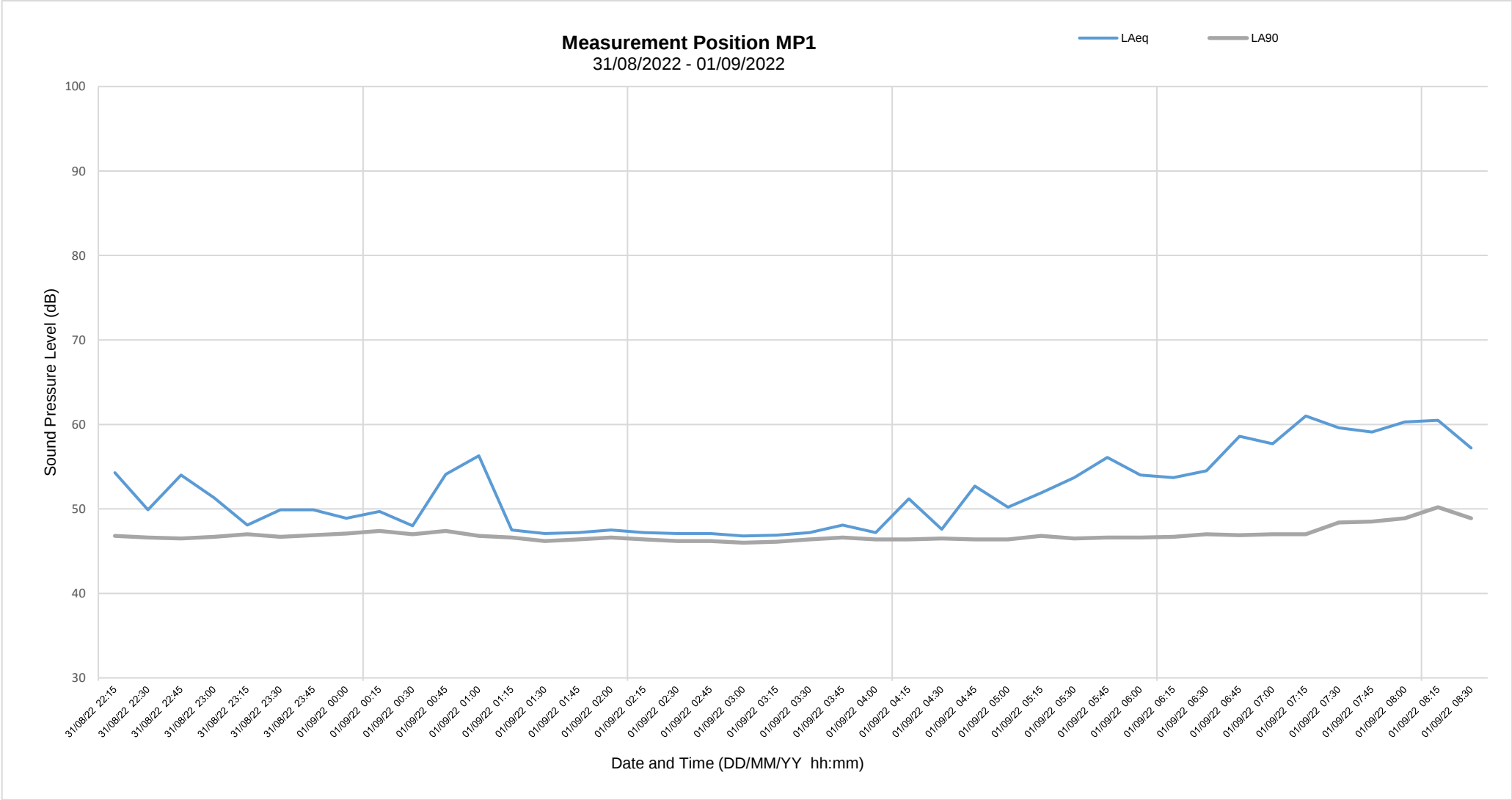
01dB CAL 21 Acoustic calibrator (serial no. 34375244)

#### METHODOLOGY

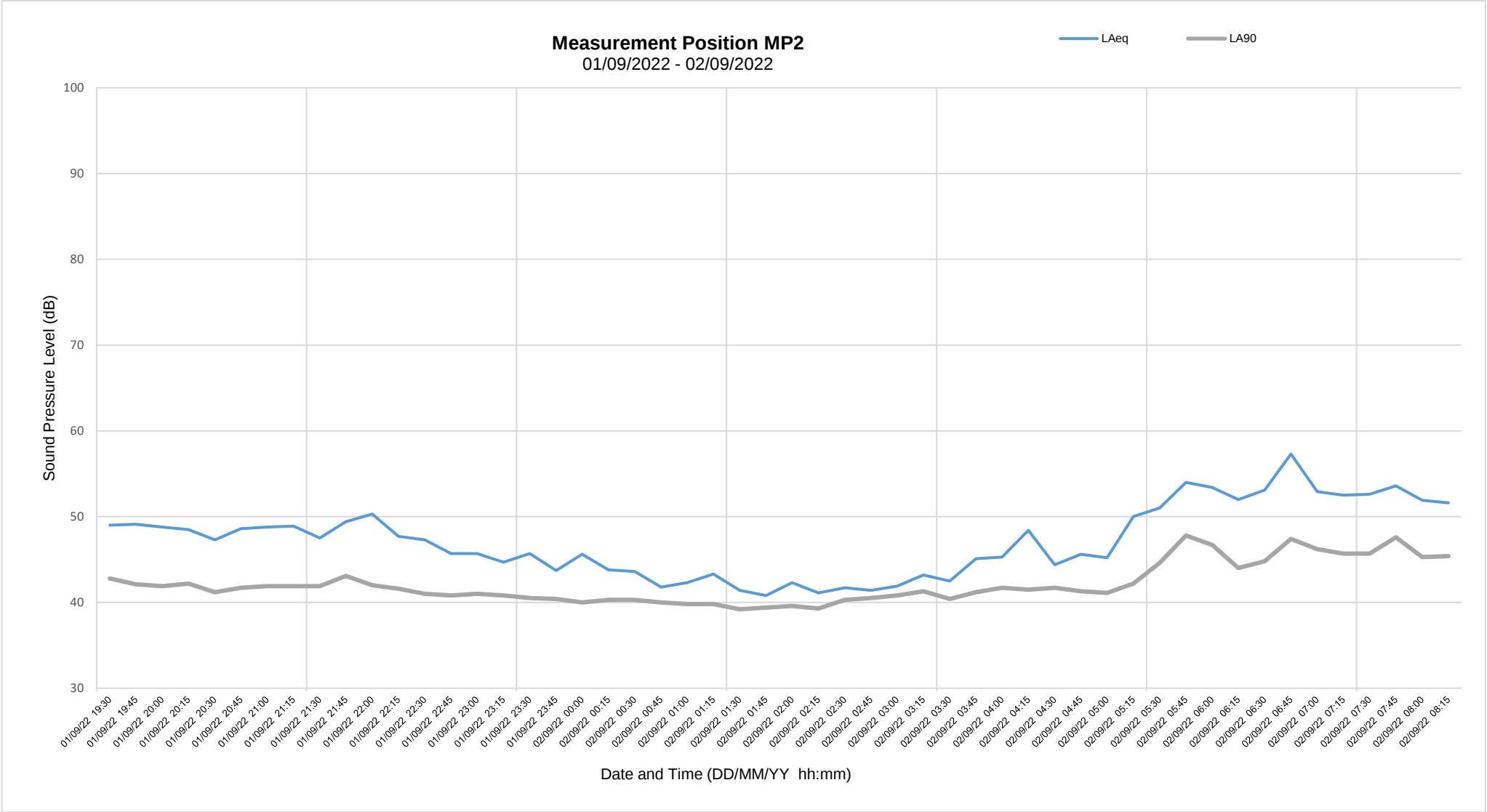
Before and after the measurements the noise monitoring equipment was calibrated to an accuracy of  $\pm 0.3$ dB using the Cal 21 Calibrator. The calibrator produces a sound pressure level of 94dB re  $2 \times 10^{-5}$  Pa @ 1kHz.

#### MEASUREMENT RESULTS

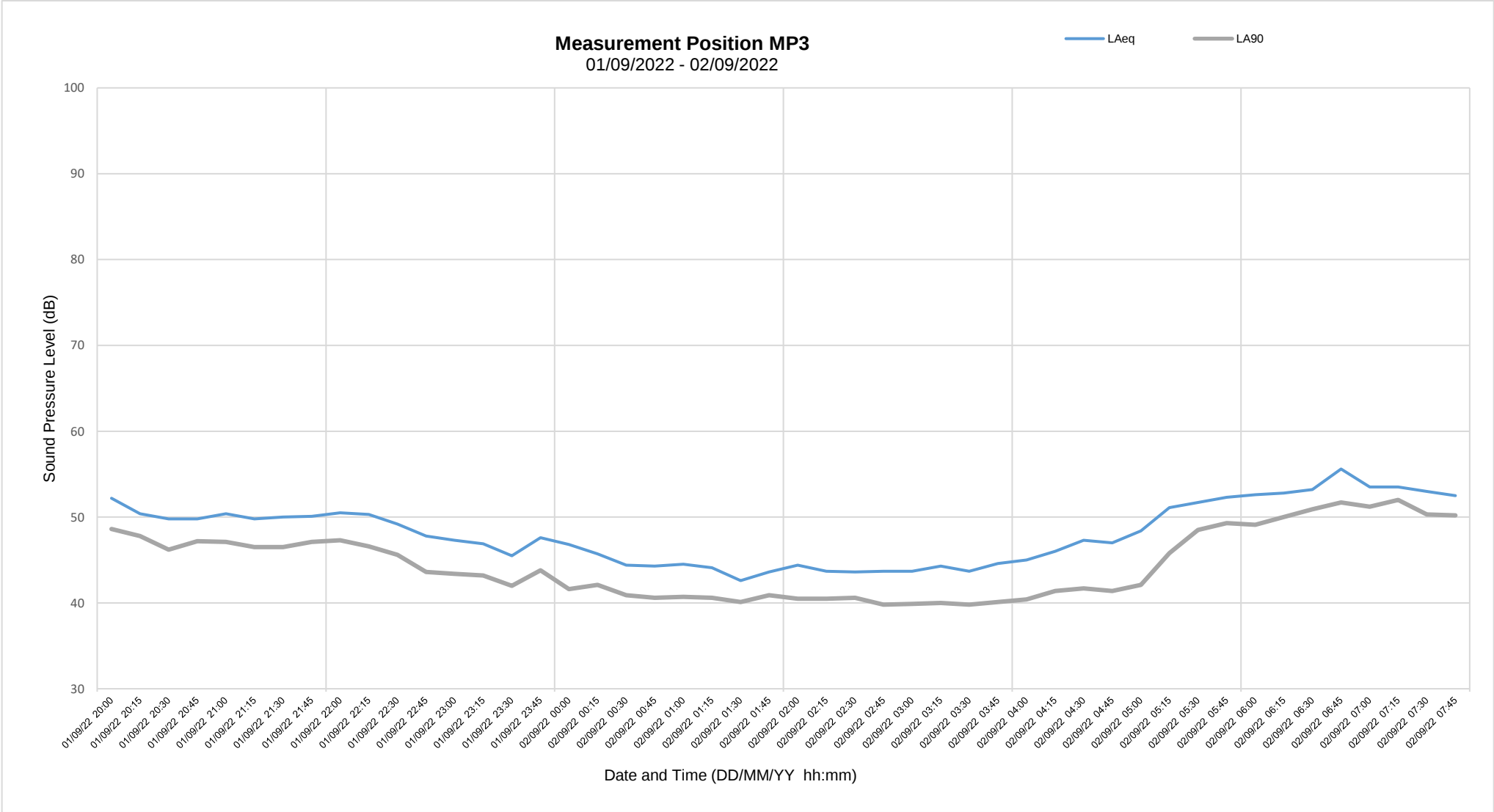
Graphs A1 to A3 summarise the results obtained at Monitoring Positions MP1, MP2 and MP3 respectively.



Graph A1: Graph showing measured environmental noise levels, Measurement Position MP1, 31 August 2022 – 01 September 2022.



**Graph A2:** Graph showing measured environmental noise levels, Measurement Position MP2, 01 September 2022 – 02 September 2022.



**Graph A3:** Graph showing measured environmental noise levels, Measurement Position MP3, 01 September 2022 – 02 September 2022.