

# Noise and Vibration Monitoring Report (November 2023 – April 2024)

Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works

|                        |                                      |
|------------------------|--------------------------------------|
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## Document approval

| Rev        | Date | Prepared by | Reviewed by | Approved by |
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| 01         |      | ██████████  | ██████████  | ██████████  |
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## Details of Revision Amendments

### Document Control

The Project Director is responsible for ensuring that this report is reviewed and approved. The Project Discipline Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

### Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed/implemented.

### Revision Details

| Revision | Details  |
|----------|--|
| 00       | Compliance report for issue to SM and stakeholders |



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# 1. Introduction

## 1.1. Background

The Sydney Metro Western Sydney Airport will become the transport spine for Greater Western Sydney, connecting communities and travellers with the new Western Sydney International (Nancy-Bird Walton) Airport (referred to as Western Sydney International) and the growing region.

The Project forms part of the broader Sydney Metro network. It involves the construction and operation of a 23km new metro rail line that extends from the existing Sydney Trains suburban T1 Western Line (at St Marys) in the north and the Aerotropolis (at Bringelly) in the south. The alignment includes a combination of tunnels and civil structures, including viaduct, bridges, surface and open-cut troughs between the two tunnel sections.

The Sydney Metro Western Sydney Airport EIS was prepared in October 2020 to assess the impacts of construction and operation of the Project and was placed on public exhibition between 21 October 2020 and 2 December 2020. The Project was declared a Critical State Significant Infrastructure (CSSI) Project and is listed in Schedule 5 of *State Environmental Planning Policy (State and Regional Development)*.

The Sydney Metro Western Sydney Airport was approved by the Minister for Planning and Public Spaces on 23 July 2021 (SSI 10051) under section 5.19 of the *Environmental Planning and Assessment Act 1997* (EP&A Act).

The Project will be delivered through the following stages:

- **Advanced and Enabling Works (AEW)** – Site investigations, modification of the existing transport network, power and water supply for construction sites, utility and stormwater diversions and some demolition works.
- **Station Boxes and Tunnelling Works (SBT)** – delivered through the following sub-stages:
  - Preparatory Works (the subject of this Plan) – Including NSW (off-airport) demolition works, site levelling/grading, site access and parking, utility and temporary services works, erection of demountable buildings and noise barriers, tunnelling preparatory works and use of ancillary facilities including onsite parking.
  - Bulk Excavation and Tunnelling Works – Preparatory Works (works not completed prior to Final CEMP approval), bulk excavation, acoustic shed installation, tunnelling and cross passage installation.
- **Surface and Civil Alignment Works (SCAW)** – Construction of bridges and viaducts to cross floodplains, watercourses and existing and proposed permanent infrastructure.
- **Stations, Systems, Trains, Operations and Maintenance (SSTOM)**– Station design and fitout, testing and commissioning, and operation of the Western Sydney Airport metro service
- **Finalisation Auxiliary Works.**

Each package of work is to be delivered under separate contracts on behalf of the proponent Sydney Metro.



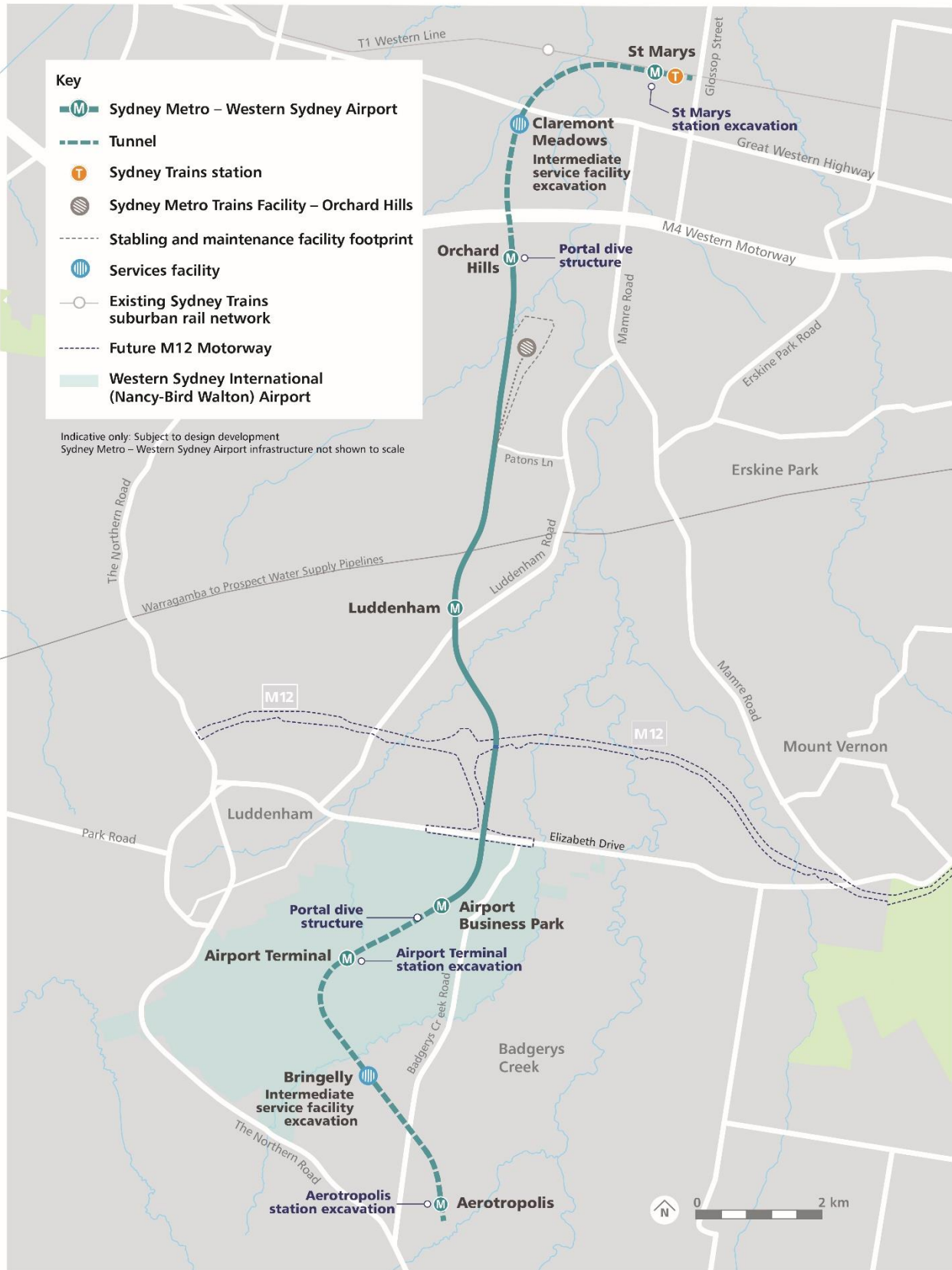


Figure 1: Overview of the Project



### 1.1.1. Station Boxes and Tunnelling Works

The CPB Ghella JV (CPBG) has been engaged to deliver the SBT Works. The SBT Works include the design and construction of:

- Two sections of twin tunnels with a total combined length of approximately 9.8km, including associated portal structures; Orchard Hills to St Marys and Western Sydney International (WSI) airport to the new Aerotropolis Station in NSW
- Excavations at either end to enable trains to turn back and stub tunnels to enable future extensions.
- Station box excavations with temporary ground support for four stations at St Marys, Orchard Hills, Airport Terminal and Aerotropolis
- Excavations for two intermediate service facilities, one in each of the tunnel sections at Claremont and Bringelly.

Completed sections of the SBT Works, including established construction worksites, will be progressively handed over to Sydney Metro to enable follow-on contractors to commence works. The exception is the on-airport Precast Segment Storage Facility which will be decommissioned and hydroseeded following the completion of segment manufacture.

### 1.1.2. Site List

CPBG has eight Project sites, five of which are in NSW under the CSSI 10051 and the other three are on Commonwealth land under the Airport Plan. The Airport Plan sites are greyed out in the below table. The CSSI sites are north and south of the Commonwealth airport site.

Table 1: SBT Worksite overview

| Jurisdiction           | Worksite                       | Abbreviation |
|------------------------|--------------------------------|--------------|
| NSW (north of Airport) | St Marys                       | STM          |
| NSW (north of Airport) | Claremont Meadows              | CMF          |
| NSW (north of Airport) | Orchard Hills                  | OHE          |
| On-Airport             | Airport Portal Dive Structure  | APB          |
| On-Airport             | Airport Terminal and TBM shaft | ATL          |
| On-Airport             | Primary Spoil Reveal           | FS01         |
| NSW (south of Airport) | Bringelly                      | BSF          |
| NSW (south of Airport) | Aerotropolis                   | AEC          |



### 1.1.2.1. Handover portions

During this monitoring period, SSTOM works commenced at St Marys, Orchard Hills and Aerotropolis.

SBT had handed over all portions of St Marys (20 November 2023) and Aerotropolis (4 October 2023) to Sydney Metro at the end of station box excavation.

SBT has retaken a portion of the St Marys site (area outlined in green in Figure 2) and Aerotropolis site (Portion S7, Figure 3) for TBM retrieval works. TBM Retrieval works at St Marys and Aerotropolis commenced on 25 March 2024.

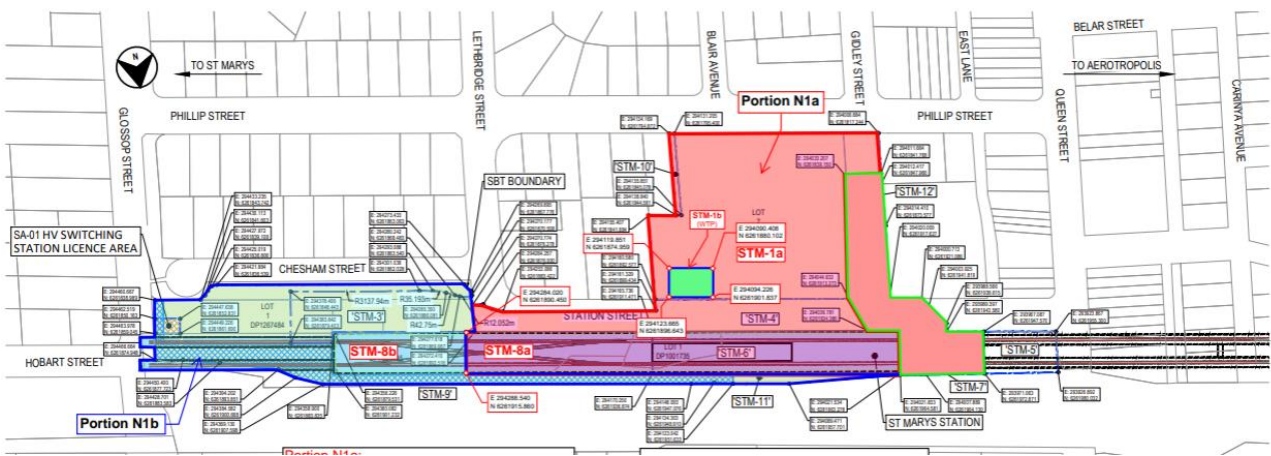


Figure 2: STM Portions Maps

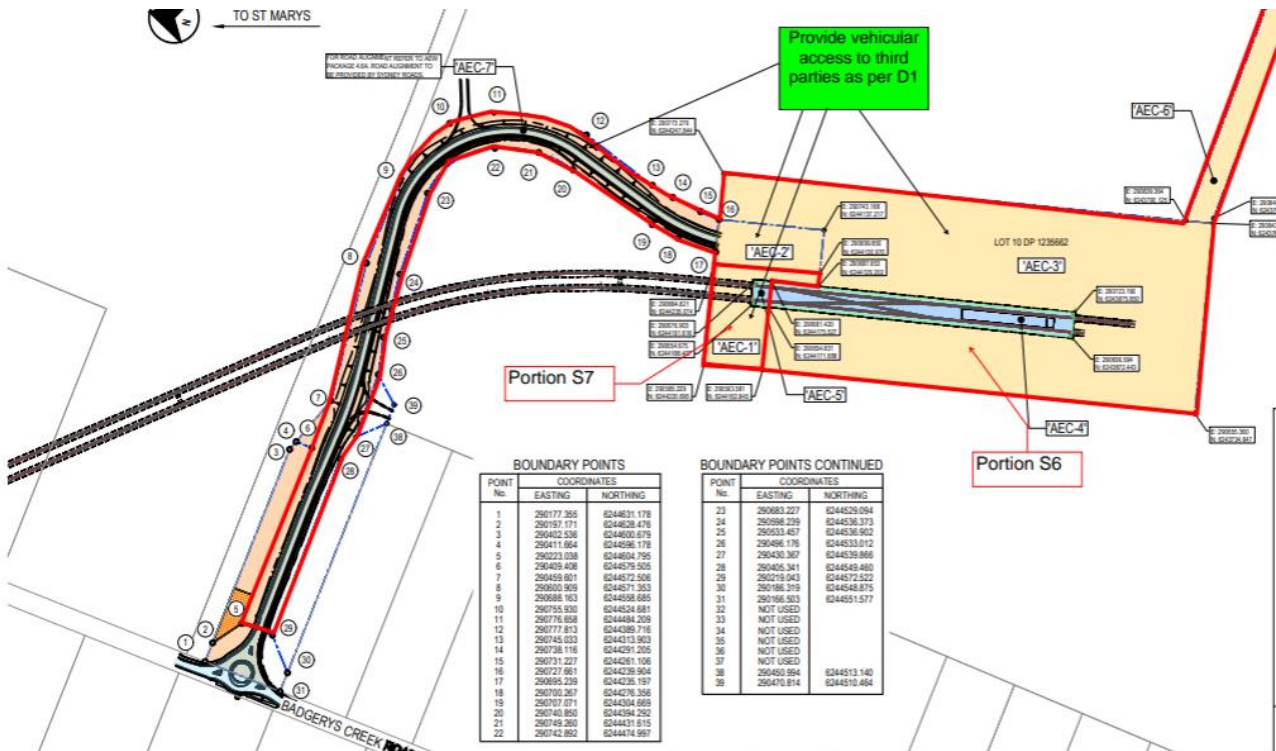


Figure 3: AEC Portions Map





The southern portion of the Orchard Hills was handed over to Sydney Metro on 31 October 2023. SBT works are only occurring within the northern portion of the Orchard Hills site in Portion N4 (Figure 4).

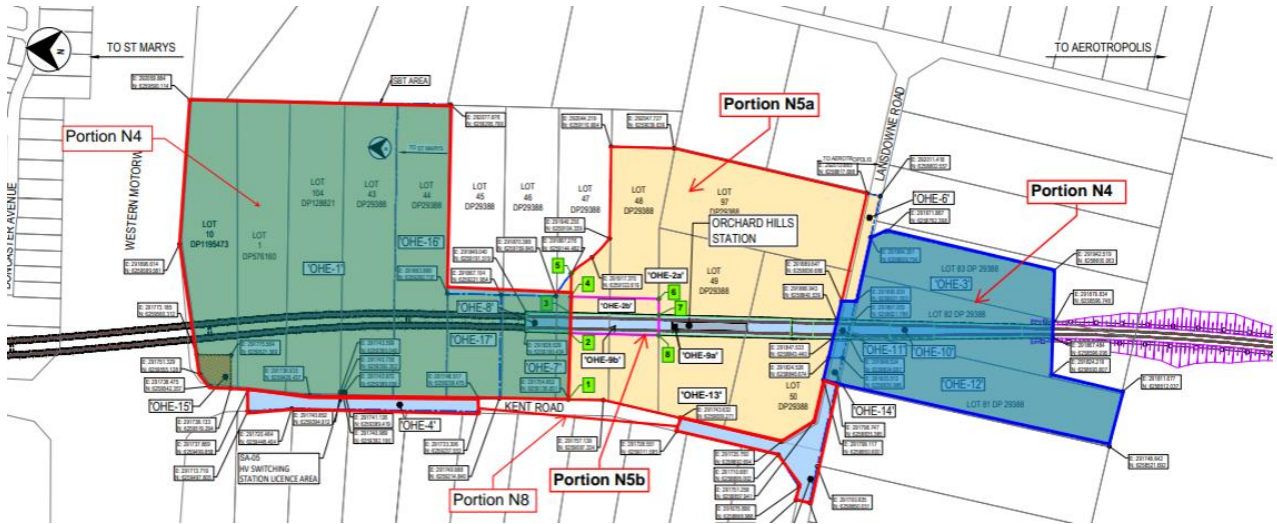


Figure 4: OHE Portions Map



## 1.2. Purpose of this report

The purpose of this report is to present results of the Noise and Vibration Monitoring Program outlined in the SBT Construction Environmental Management Plan (CEMP) and Construction Noise and Vibration Management Sub-plan, including the results of the construction monitoring programs referred to in Condition C13 of the Infrastructure Approval.

The Noise and Vibration Monitoring Report has been prepared to address Minister’s Condition of Approval (CoA) C22 of the Infrastructure Approval (refer to Table 3). This report will be provided to the relevant regulatory authorities as detailed in the relevant Sub-plan (refer to Table 2).

Environmental monitoring is undertaken to:

- Validate the predicted impacts of the Infrastructure Works
- Measure the effectiveness of environmental controls in minimising and managing environmental impacts.
- Demonstrate compliance with relevant stakeholder conditions.

The monitoring requirements for nominated aspects are included in the relevant environmental management sub-plans and summarised in Table 2.

This report is to cover the monitoring period from October 10 2023 to April 10 2024. All data from October however can be found in the previous 6-monthly report Noise and Vibration Monitoring Report (May - October) (SMWSASBT-CPG-SWD-SW000-EN-RPT-295335). Data from November 1 to April 30 is found in this report.

Table 2: Environmental Monitoring Reporting Requirements

| CEMP or Sub-plan                        | Monitoring Program                     | Report                                | Distribution | Schedule (during construction) |
|---|--|---------------------------------------|--------------|--------------------------------|
| Noise and Vibration Management Sub-Plan | Noise and Vibration Monitoring Program | Noise and Vibration Monitoring Report | EPA, DPE     | Semi-annual                    |

Table 3: Conditions of Approval (CoA)

| CoA | Detail   | Addressed  |
|-----|--|--|
| C15 | The Noise and Vibration Construction Monitoring Program must include:<br>(a) noise and vibration monitoring at representative residential and other locations (including at the worst- affected residences), subject to property owner approval, to confirm construction noise and vibration levels; | NVCMP  |
|     | (b) monitoring undertaken during the day, evening and night-time periods throughout the construction period and cover the range of activities being undertaken;  | NVCMP<br>Section Error!<br>Reference source not found. : Error!<br>Reference source not found. |



| CoA | Detail  | Addressed  |
|-----|---|--|
|     | (c) method and frequency for reporting monitoring results; and  | NVCMP Section<br><b>Error! Reference source not found.:<br/>Error! Reference source not found.</b> |
|     | (d) a process to undertake real time noise and vibration monitoring.  | NVCMP<br>1.5.1 Continuous Monitoring   |
|     | The results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request.  | This Report  |
| C22 | The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program | This Report  |

### 1.3. On-site Activity

All station boxes and service facility sites have been established with all support services completed. The Airport Terminal station box and Shaft excavation has been completed and all four TBMs have commenced tunnelling including breakthrough and relaunch of TBMs at Claremont meadows and Bringelly. Cross passage excavation and activities has commenced and is currently continuing in the north and south. Spoil handling and removal of spoil from tunnelling is occurring from Orchard Hills and Airport terminal. Environmental controls including ERSED and Noise control have been installed across all sites.

SBT has retaken partial areas of St Marys and Aerotropolis for TBM retrieval works to occur at both sites. This work includes road works, minor earth works and tower crane installation works. While these activities commenced in April 2024, the majority of these works will be undertaken in the next reporting period.

### 1.4. Monthly Construction Updates

#### 1.4.1. November

Portion N1b (St Marys Stub tunnels) achieved Substantial Completion on 15 November 2023. This is the completion of works for St Marys. The final excavation of the Airport Terminal Station box and concrete blinding is complete.

Demobilisation is underway with the Airport Terminal Box site and the sections of Airport Business Park due for handover in December 23. Tunnelling in the north continues with both machines now consistently advancing over 25m per 24hr period. Tunnelling in the south is currently on hold as the TBM's infrastructure is relocated from the Airport Business Park to the Airport Terminal Temporary Shaft.



Cross passages continue in the north with excavation now commenced in XP20 and XP21. In the South excavation continues in XP06 and XP05. Lining works continues in XP2-XP4. Invert works have commenced in the South with repairs and preparatory works ongoing. The first pours have been completed.

### 1.4.2. December

The program critical path for December 2023 is driven by the TBM excavation, followed by cross passage and invert construction for both northern and southern tunnel portion milestones. Furthermore, in the north, the completion of the TBM excavation is also driving an additional critical path for the OHE portal construction.

The completion of ATL station box, achieving substantial completion on 14/12/2023, the relaunch of both TBM's in the South and topped off with the breakthrough of TBM#1 (Catherine) to Claremont Services Facility Shaft in the North.

The team continues to focus on the ring build and grouting, key areas in ensuring quality construction. Three cross passage (XP) ramps have been poured in the northern tunnel with excavation commenced within XP 16.

In the South the XP works have continued with the arch pour being completed in XP4. Works are underway to complete the arch pour in XP5 this month. Waterproofing works continue in XP6. Steel fixing and preparation for the arch pours continue in XP2,3 and 5.

### 1.4.3. January

The four TBM's have ramped back up in January after the Christmas break. TBM#2 (Marlene) has broken through into Claremont shaft and is currently traversing across the shaft. TBM #1 (Catherine) has restarted and continues to cut towards St Marys. The site team has put a big effort in to minimising down time and getting each shift consistently cutting and ring building.

TBM#3 (Eileen) has had a slower start to the new year however by the end of January is back to cutting and ring building consistently. After running the conveyor in manual mode TBM#4 (Peggy) now has a fully commissioned conveyor system and is cutting and building consistently. All four TBM crews are focussed on a safe high quality ring build.

Cross passages in the south have continued with cross passages 8,9 and 10 underway. In the North the cross passages have progressed with commencement of the FRP works in the first cross passage. Excavation is underway at three fronts and the team are focussed on maintaining this level of works.

### 1.4.4. February

The month of February has seen significant change in the North and South. TBM#2 (Marlene) has broken through and traversed Claremont shaft. Both TBM's have cleared the shaft, the blind rings have been broken out and the shaft has been reconfigured.

With the breakthrough, traverse and relaunch of TBM's #1 (Catherine) and #2 (Marlene) completed, the Claremont Shaft has been reconfigured to allow logistics to be managed from OHE and CMF. Segments, cross passage spoil, service pipes and other equipment can be managed from either site.

TBM's#3 (Eileen) and #4 (Peggy) have broken into Bringelly Shaft and are currently traversing across the shaft. The traverse and relaunch will allow a focus in XPs for the first two weeks in



March. The TBM's will traverse across the shaft building blind rings behind them before pulling up to breakout the rings and install conveyor boosters.

In the cross passage and invert space the most work has been achieved in portion S9 (On-Airport Tunnel) which is approaching its completion date. All Cross passages have been constructed in XP2-XP6. Cross passage excavation continues behind the TBM's. In portion N9 (Tunnel ATL to AEC) cross passages have continued with XP21 and XP20 excavation complete and lining commenced. Excavation of XP16,18 and 19 continues.

### 1.4.5. March

TBM#1 (Catherine) and TBM#2(Marlene) have continued excavation heading towards St Marys. TBM#1 has completed 527m for the month. TBM#2 has completed 401m. TBM#3 (Eileen) and TBM#4 (Peggy) have completed traversing BSF and relaunched towards Aerotropolis. BNF has been reconfigured as a logistics site for cross passage works. The conveyor boosters have been installed. TBM#3 has completed 235m for the month. TBM#4 has completed 168m.

Cross passages in the North have started to build momentum. There are now 3 excavation machines in operation with the 4th and 5th machines under repair and expected to be back in use by mid-April. The waterproofing and lining works continue with 2 cross passages completed. 3 cross passages are currently underway with lining activities. Southern cross passages have continued with three excavation fronts and lining activities continuing behind this excavation work.

A significant focus this month has been on completion and handover of portion S9 (On-Airport Tunnel). Invert construction, cross passage construction, patching and clean up works have all been undertaken to achieve completion.

SBT Works recommenced at Aerotropolis and St Marys. The retrieval sites (refer to Section 1.1.2.1) have had fencing installed, site facilities and surface civil modifications have commenced.

### 1.4.6. April

TBM#1 (Catherine) and TBM#2(Marlene) have continued excavation heading towards St Marys. TBM#3 (Eileen) and TBM#4 (Peggy) have continued excavation heading towards Aerotropolis.

After passing the S9 (On-Airport Tunnel) substantial completion milestone, Portion S2 (APB) has also achieved Substantial Completion this month. This consisted of the surface area at ABP and the dive itself.

TBMs have continued this month with the first northern TBM#1 within 500m of the St Marys breakthrough. The first southern TBM#2 is within 800m of the breakthrough at Aerotropolis.

Cross passages have continued both North and South. Multiple fronts of excavation and FRP have been working away. Invert construction is on hold until enough area is available to allow a continuous run.

The program's critical path for April 2024 is driven by the TBM excavation, followed by cross-passage and invert construction for both northern and southern tunnel portion milestones. Furthermore, in the north, the completion of the TBM excavation is also driving an additional critical path for the OHE portal construction. In the north, the following mitigation measures were undertaken:



## 1.5. Monitoring

Noise monitoring is a requirement of both the CSSI 10051 approval and EPL 21672. Monitoring is required:

- To validate the noise predictions for works undertaken outside of the standard construction hours as per the DNVIS.
- As a result of noise and vibration complaints; or
- As otherwise directed.

Results of monitoring will be used for:

- The evaluation of performance relative to legal, regulatory, contract, permit, licence and other commitments
- The prompt identification and correction of incidents or possible incidents
- Providing feedback on approval documents; and
- Providing the basis of internal and external reporting.

Noise monitoring results can be found in Section **Error! Reference source not found.** of this report.

Between November 2023 and April 2024, the project has had 17 community complaints relating to noise and 2 relating to vibration. A breakdown of complaints by month and site can be found in Table 4.

Table 4: Community Noise and Vibration Complaints

| Month    | Site          | Complaint Type | Works undertaken at the time of complaint |
|----------|---------------|----------------|---|
| January  | Orchard Hills | Noise          | OOHW Tunnelling / Traffic                 |
| February | Orchard Hills | Noise          | OOHW Tunnelling / Traffic                 |
| March    | Orchard Hills | Noise          | OOHW Tunnelling / Traffic                 |
|          |               |                | OOHW Tunnelling                           |
|          | Bringelly     | Vibration      | OOHW Tunnelling                           |
| April    | Orchard Hills | Noise          | OOHW Tunnelling                           |
|          |               |                | OOHW Tunnelling / Traffic                 |
|          |               |                | OOHW Tunnelling / Traffic                 |
|          |               |                | OOHW Tunnelling / Traffic                 |
|          |               |                | OOHW Tunnelling / Traffic                 |
|          |               |                | OOHW Tunnelling / Traffic                 |
|          |               |                | OOHW Tunnelling / Traffic                 |
|          |               |                | OOHW Tunnelling / Traffic                 |



| Month | Site              | Complaint Type | Works undertaken at the time of complaint |
|-------|-------------------|----------------|---|
|       |                   |                | OOHW Tunnelling / Traffic                 |
|       |                   |                | OOHW Tunnelling / Traffic                 |
|       |                   |                | OOHW Tunnelling / Traffic                 |
|       |                   |                | OOHW Tunnelling / Traffic                 |
|       |                   |                | OOHW Tunnelling / Traffic                 |
|       | Claremont Meadows | Vibration      | OOHW Tunnelling                           |

After a complaint is made an internal investigation takes place, which may include on-site noise and vibration monitoring. All investigations concluded that SBT works were justified and not the probable cause of the noise and vibration.

The results of monitoring between November 2023 and April 2024 are presented below. Any anomalous readings or exceedances are identified within the Comments column of the tables.

### 1.5.1. Continuous Monitoring

Continuous noise monitoring was undertaken across each site by Sitehive units recording LAeq. The results from each Sitehive unit are shown in Annexure A. Each unit has undertaken monitoring throughout the reporting period. The larger daily spike may be contributed to external noise impacts. For the most part, gaps within the Sitehive data is due to technical issues or the unit needed to be replaced. In one instance on-airport, a unit got flooded completely and stopped recording.

### 1.5.2. Vibration monitoring

Throughout the reporting period, the Goods Shed adjacent to the St Marys Station Box site underwent continuous vibration monitoring. There was no significant exceedances recorded, except for a minor instance exceeding the amber limit by 0.25mm/s above the threshold of 1.05mm/s. This exceedance was investigated and revealed that no SBT works were taking place at the time, external factors were likely responsible for the incident.

Ground borne noise and vibration monitoring was undertaken at three residential properties along the northern alignment. Monitoring was undertaken at three Claremont Meadows properties:

- 75A Blackwood Street
- 11 Falcon Cres and
- 6 Powie Close,.

The results (Annexure B) showed actual vibration was lower than predicted at all three properties.



## 2. Monthly Noise data

Noise monitoring is undertaken in accordance with both the CSSI 10051 approval and EPL 21672. The reason for monitoring are outlined in Section 1.5.





## 2.1. November 2023

Monitoring undertaken in November was to verify noise impacts of additional plant.

| Date       | Time    | Works Period | Construction Activity                | Activity Location | Monitoring Location     | NML (dBA) | Predicted (dBA) | Additional Mitigation Measures | Recorded $L_{eq, 15min}$ (dBA) | $L_{Amax}$ | $L_{Amin}$ | Exceedance of Predicted (dBA) | Exceedance of Predicted | Comments   |
|------------|---------|--------------|--------------------------------------|-------------------|-------------------------|-----------|-----------------|--------------------------------|--------------------------------|------------|------------|-------------------------------|-------------------------|--|
| 23/11/2023 | 10:30am | Day          | Water cart and water treatment plant | Bringelly         | 38 Derwent Rd Bradfield | 45        | 49              | NA                             | 46.6                           | 63.3       | 37.6       | -2.4                          | No                      | Verification noise monitoring – Construction noise was the main source |

## 2.2. December 2023

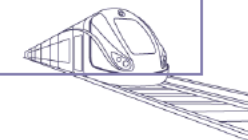
No Monitoring was undertaken during the month of December. No OOHW that required noise monitoring was undertaken. Continuous noise monitoring was undertaken during December, the results are shown in Annexure A.

## 2.3. January 2024

No Monitoring was undertaken during the month of January. No OOHW that required noise monitoring was undertaken. Continuous noise monitoring was undertaken during December, the results are shown in Annexure A.

## 2.4. February 2024

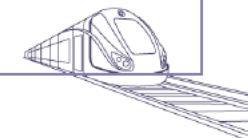
No Monitoring was undertaken during the month of February. No OOHW that required noise monitoring was undertaken. Continuous noise monitoring was undertaken during December, the results are shown in Annexure A.



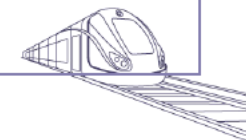
## March 2024

Monitoring undertaken in March was largely due to new out of hours works activities starting to verify predicted noise levels. These works included tunnelling works, road works and TBM support / retrieval works. The below table shows the predicted noise levels and the exceedances compared to the predicted noise levels that modelling.

| Date       | Time    | Works Period | Construction Activity | Activity Location | Monitoring Location           | NML (dBA) | Predicted (dBA) | Additional Mitigation Measures | Recorded $L_{eq, 15min}$ (dBA) | $L_{Amax}$ | $L_{Amin}$ | Exceedance of Predicted (dBA) | Exceedance of Predicted | Comments  |
|------------|---------|--------------|-----------------------|-------------------|-------------------------------|-----------|-----------------|--------------------------------|--------------------------------|------------|------------|-------------------------------|-------------------------|---|
| 4/03/2024  | 8:02pm  | Evening      | Conveyor Works        | OHE               | 77 Kent Road Orchard Hills    | 49        | 61              | LB, M ,                        | 55.6                           | 74.2       | 48.8       | -5.4                          | No                      | Verification noise monitoring - extraneous noise was dominant noise source - construction was inaudible |
| 4/03/2024  | 7:24pm  | Evening      | Spoil Shed Works      | OHE               | On site (within the hoarding) | 49        | NA              | NA                             | 76.3                           | 82.8       | 69.9       | NA                            | NA                      | Construction noise was dominant noise source for majority of monitoring period.                         |
| 18/03/2024 | 10:15pm | Night        | Saw Cutting           | OHE               | 57 Kent Road                  | 46        | 102             | LB, M, SN, RO, IB              | 73.6                           | 83.6       | 55.7       | -28.4                         | No                      | Construction noise was dominant noise source for majority of monitoring period.                         |
| 18/03/2024 | 10:33pm | Night        | Saw Cutting           | OHE               | 57 Kent Road                  | 46        | 102             | LB, M, SN, RO, IB              | 66.1                           | 72         | 50.1       | -35.9                         | No                      | Construction noise was dominant noise source for majority of monitoring period.                         |



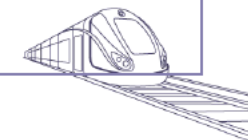
| Date       | Time    | Works Period | Construction Activity | Activity Location | Monitoring Location | NML (dBA) | Predicted (dBA) | Additional Mitigation Measures | Recorded $L_{eq, 15min}$ (dBA) | $L_{Amax}$ | $L_{Amin}$ | Exceedance of Predicted (dBA) | Exceedance of Predicted | Comments  |
|------------|---------|--------------|-----------------------|-------------------|---------------------|-----------|-----------------|--------------------------------|--------------------------------|------------|------------|-------------------------------|-------------------------|---|
| 18/03/2024 | 10:50pm | Night        | Saw Cutting           | OHE               | 57 Kent Road        | 46        | 102             | LB, M, SN, RO, IB              | 70                             | 90.4       | 58.9       | -32                           | No                      | Construction noise was dominant noise source for majority of monitoring period. |
| 18/03/2024 | 11:07pm | Night        | Saw Cutting           | OHE               | 63 Kent Road        | 46        | 88              | LB, M, SN, RO, IB              | 60.5                           | 80.5       | 47.9       | -27.5                         | No                      | Construction noise was dominant noise source for majority of monitoring period. |
| 18/03/2024 | 1:04am  | Night        | Saw Cutting           | OHE               | 63 Kent Road        | 46        | 88              | LB, M, SN, RO, IB              | 70.4                           | 94.5       | 58.1       | -17.6                         | No                      | Construction noise was dominant noise source for majority of monitoring period. |
| 20/03/2024 | 1:54am  | Night        | Road Works            | OHE               | 63 Kent Road        | 46        | 90              | LB, M, SN, RO, IB              | 67.2                           | 84.4       | 45.8       | -22.8                         | No                      | Construction noise was dominant noise source for majority of monitoring period. |
| 20/03/2024 | 10:50pm | Night        | Road Works            | OHE               | 63 Kent Road        | 46        | 90              | LB, M, SN, RO, IB              | 69.8                           | 78.6       | 31         | -20.2                         | No                      | Construction noise was dominant noise source for majority of                    |



| Date       | Time    | Works Period | Construction Activity | Activity Location | Monitoring Location | NML (dBA) | Predicted (dBA) | Additional Mitigation Measures | Recorded L <sub>eq, 15min</sub> (dBA) | L <sub>Amax</sub> | L <sub>Amin</sub> | Exceedance of Predicted (dBA) | Exceedance of Predicted | Comments  |
|------------|---------|--------------|-----------------------|-------------------|---------------------|-----------|-----------------|--------------------------------|---------------------------------------|-------------------|-------------------|-------------------------------|-------------------------|---|
|            |         |              |                       |                   |                     |           |                 |                                |                                       |                   |                   |                               |                         | monitoring period.  |
| 20/03/2024 | 9:33pm  | Night        | Road Works            | OHE               | 63 Kent Road        | 46        | 90              | LB, M, SN, RO, IB              | 66.3                                  | 88.7              | 54.3              | -23.7                         | No                      | Construction noise was dominant noise source for majority of monitoring period.     |
| 20/03/2024 | 9:11pm  | Night        | Road Works            | OHE               | 63 Kent Road        | 46        | 90              | LB, M, SN, RO, IB              | 71.6                                  | 78.5              | 56.4              | -18.4                         | No                      | Construction noise was dominant noise source for majority of monitoring period.     |
| 18/03/2024 | 10:15pm | Night        | Crane Lifts           | CMF               | 2 Picnic Pl         | 41        | 43              | LB, M                          | 49.9                                  | 64.5              | 41.4              | 6.9                           | Yes                     | Construction noise was not dominant noise source for majority of monitoring period. |
| 18/03/2024 | 11:16pm | Night        | Crane Lifts           | CMF               | 2 Picnic Pl         | 41        | 43              | LB, M                          | 46.1                                  | 56.4              | 40.4              | 3.1                           | Yes                     | Construction noise was not dominant noise source for majority of monitoring period. |
| 18/03/2024 | 9:07pm  | Night        | Crane Lifts           | CMF               | 2 Picnic Pl         | 41        | 43              | LB, M                          | 50.6                                  | 66.1              | 43.6              | 7.6                           | Yes                     | Construction noise was not dominant noise source for                                |



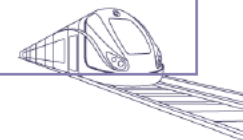
| Date      | Time   | Works Period | Construction Activity | Activity Location | Monitoring Location           | NML (dBA) | Predicted (dBA) | Additional Mitigation Measures | Recorded $L_{eq, 15min}$ (dBA) | $L_{Amax}$ | $L_{Amin}$ | Exceedance of Predicted (dBA) | Exceedance of Predicted | Comments  |
|-----------|--------|--------------|-----------------------|-------------------|-------------------------------|-----------|-----------------|--------------------------------|--------------------------------|------------|------------|-------------------------------|-------------------------|---|
|           |        |              |                       |                   |                               |           |                 |                                |                                |            |            |                               |                         | majority of monitoring period.  |
| 5/03/2024 | 2:55pm | Night        | Crane Lifts           | CMF               | On site (within the hoarding) | 41        | 60.5            | LB, M                          | 64.4                           | 76.5       | 56.3       | 3.9                           | Yes                     | Construction noise was not dominant noise source for majority of monitoring period. |



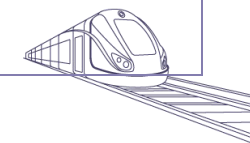
## April 2024

Monitoring undertaken in April was due to new out of hours works activities starting to verify predicted noise levels. These works included TBM retrieval works, road works and TBM support. The below table shows the predicted noise levels and the exceedances compared to the predicted noise levels that modelling.

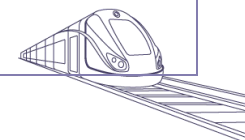
| Date       | Time    | Works Period | Construction Activity                             | Activity Location | Monitoring Location            | NML (dBA) | Predicted (dBA) | Additional Mitigation Measures | Recorded $L_{eq, 15min}$ (dBA) | $L_{Amax}$ | $L_{Amin}$ | Exceedance of Predicted (dBA) | Exceedance of Predicted | Comments   |
|------------|---------|--------------|---|-------------------|--------------------------------|-----------|-----------------|--------------------------------|--------------------------------|------------|------------|-------------------------------|-------------------------|--|
| 03/04/2024 | 11:31pm | Night        | TBI Works – Jersey Kerb Removal + Trenching Works | St Marys TBI      | 34-36 Phillip Street, St Marys | 41        | 54              | LB, M, SN, RO, IB              | 45.0                           | 64.1       | 40.5       | -9.0                          | No                      | Extraneous noise such as traffic was dominant noise source for majority of the monitoring period. Minimal use of high noise impact plant during attended noise monitoring. As such, measured $L_{aeq}$ assessed against predicted noise level for scenario without high impact plant.<br><br>Attended noise monitoring planned for next occasion of high impact trenching works to capture |



|            |         |         |   |                   |                                     |    |     |                   |      |      |      |       |     |   |  |
|------------|---------|---------|---|-------------------|-------------------------------------|----|-----|-------------------|------|------|------|-------|-----|---|--|
|            |         |         |   |                   |                                     |    |     |                   |      |      |      |       |     |   | monitoring data representative of assessment scenario. |
| 7/04/2024  | 10:02pm | Night   | TBI Works – Jersey Kerb Removal + Trenching Works (High Impact) | St Marys TBI      | 34-36 Phillip Street, St Marys      | 41 | 68  | LB, M, SN, RO, IB | 54.9 | 65.5 | 42.7 | -13.1 | No  | Construction noise was dominant noise source for majority of monitoring period. |  |
| 10/04/2024 | 4:08am  | Night   | Road Median Island Works (High impact)                          | St Marys TBI      | 34-36 Phillip Street, St Marys      | 41 | 49  | LB, M, SN, RO, IB | 47.4 | 65.3 | 41.2 | -1.6  | No  | Construction noise was dominant noise source for majority of monitoring period. |  |
| 22/04/2024 | 6:01pm  | Evening | No Works  | Claremont Meadows | 2 Putland Street, Claremont Meadows | 41 | N/A | -                 | 54.4 | 61.6 | 48.4 | N/A   | N/A | No construction activities occurring at time of monitoring event                |  |
| 22/04/2024 | 6:23pm  | Evening | No Works  | Claremont Meadows | 2 Picnic Place, Claremont Meadows   | 42 | N/A | -                 | 50.1 | 62.5 | 44.8 | N/A   | N/A | No construction activities occurring at time of monitoring event                |  |
| 22/04/2024 | 7:33pm  | Evening | Crane Lifts   | Claremont Meadows | 2 Putland Street,                   | 42 | 43  | LB, M, SN         | 57.2 | 66.7 | 45.7 | 14.2  | Yes | Construction noise occasionally   |  |

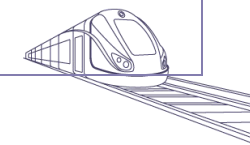


|            |         |         |             |                   |                                     |    |     |           |      |      |      |     |     |   |   |
|------------|---------|---------|-------------|-------------------|-------------------------------------|----|-----|-----------|------|------|------|-----|-----|---|---|
|            |         |         |             |                   | Claremont Meadows                   |    |     |           |      |      |      |     |     |   | audible however, extraneous noise such as traffic was dominant noise source during monitoring period. |
| 22/04/2024 | 8:12pm  | Evening | Crane Lifts | Claremont Meadows | 2 Picnic Place, Claremont Meadows   | 42 | 43  | LB, M, SN | 50.3 | 70.5 | 45.4 | 7.3 | Yes | Construction noise occasionally audible however, extraneous noise such as traffic was dominant noise source during monitoring period. |   |
| 22/04/2024 | 10pm    | Night   | Crane Lifts | Claremont Meadows | 2 Putland Street, Claremont Meadows | 41 | 43  | LB, M, SN | 49.7 | 63.8 | 43.7 | 6.7 | Yes | Construction noise occasionally audible however, extraneous noise such as traffic was dominant noise source during monitoring period. |   |
| 22/04/2024 | 10:19pm | Night   | No Works    | Claremont Meadows | 2 Putland Street,                   | 41 | N/A | -         | 50.6 | 63.2 | 44.7 | N/A | N/A | No construction activities occurring at time  |   |

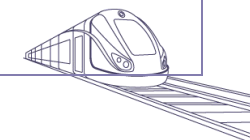




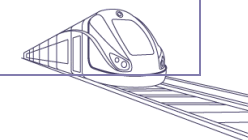
|            |         |         |                |                   |                                     |    |     |           |      |      |      |     |     |   |                      |
|------------|---------|---------|----------------|-------------------|-------------------------------------|----|-----|-----------|------|------|------|-----|-----|---|----------------------|
|            |         |         |                |                   | Claremont Meadows                   |    |     |           |      |      |      |     |     |   | of monitoring event. |
| 22/04/2024 | 10:40pm | Night   | No Works       | Claremont Meadows | 2 Picnic Place, Claremont Meadows   | 41 | N/A | -         | 45.3 | 62.6 | 40.6 | N/A | N/A | No construction activities occurring at time of monitoring event.   |                      |
| 22/04/2024 | 11pm    | Night   | Crane Lifts    | Claremont Meadows | 2 Picnic Place, Claremont Meadows   | 41 | 43  | LB, M, SN | 46.1 | 71.4 | 41.3 | 3.1 | Yes | Construction noise occasionally audible however, extraneous noise such as traffic was dominant noise source during monitoring period. |                      |
| 30/04/2024 | 7:14pm  | Evening | No works       | Claremont Meadows | 2 Putland Street, Claremont Meadows | 42 | N/A | -         | 49.8 | 65.1 | 45.2 | N/A | N/A | No construction activities occurring at time of monitoring event.   |                      |
| 30/04/2024 | 7:32pm  | Evening | Concrete Pours | Claremont Meadows | 2 Putland Street, Claremont Meadows | 42 | 43  | LB, M, SN | 47.9 | 59.7 | 43.9 | 4.9 | Yes | Construction noise occasionally audible however, extraneous noise such as traffic was dominant  |                      |



|            |         |         |                |                   |                                   |    |     |           |      |      |      |     |     |   |  |
|------------|---------|---------|----------------|-------------------|-----------------------------------|----|-----|-----------|------|------|------|-----|-----|---|--|
|            |         |         |                |                   |                                   |    |     |           |      |      |      |     |     |   | noise source during monitoring period. |
| 30/04/2024 | 9:06pm  | Evening | Concrete Pours | Claremont Meadows | 2 Picnic Place, Claremont Meadows | 42 | 43  | LB, M, SN | 46   | 56.8 | 30.6 | 3   | Yes | Construction noise occasionally audible however, extraneous noise such as traffic was dominant noise source during monitoring period. |  |
| 30/04/2024 | 9:31pm  | Evening | No works       | Claremont Meadows | 2 Picnic Place, Claremont Meadows | 42 | N/A | -         | 46   | 59.5 | 38.4 | N/A | N/A | No construction activities occurring at time of monitoring event.   |  |
| 30/04/2024 | 10:03pm | Night   | No works       | Claremont Meadows | 2 Picnic Place, Claremont Meadows | 41 | N/A | -         | 45.1 | 62.3 | 27.4 | N/A | N/A | No construction activities occurring at time of monitoring event.   |  |
| 30/04/2024 | 10:30pm | Night   | Concrete Pours | Claremont Meadows | 2 Picnic Place, Claremont Meadows | 41 | 43  | LB, M, SN | 45.7 | 64.5 | 37.6 | 2.7 | Yes | Construction noise occasionally audible however, extraneous noise such as traffic   |  |



|            |         |       |                |                   |                                     |    |     |           |      |      |      |     |     |   |   |
|------------|---------|-------|----------------|-------------------|-------------------------------------|----|-----|-----------|------|------|------|-----|-----|---|---|
|            |         |       |                |                   |                                     |    |     |           |      |      |      |     |     |   | was dominant noise source during monitoring period. |
| 30/04/2024 | 11:16pm | Night | Concrete Pours | Claremont Meadows | 2 Putland Street, Claremont Meadows | 41 | 43  | LB, M, SN | 49   | 60.7 | 35.2 | 6   | Yes | Construction noise occasionally audible however, extraneous noise such as traffic was dominant noise source during monitoring period. |   |
| 30/04/2024 | 11:33pm | Night | No works       | Claremont Meadows | 2 Putland Street, Claremont Meadows | 41 | N/A | -         | 50.4 | 62.8 | 41.4 | N/A | N/A | No construction activities occurring at time of monitoring event.   |   |

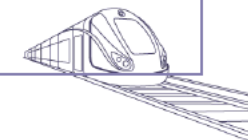


### 3.Plant Sound Power Level

On-site plant sound power level checks were conducted to validate the accuracy of the noise modelling estimations. The monitoring data presented in Table 5 confirmed that all the plant equipment met the maximum allowed LAeq, demonstrating compliance.

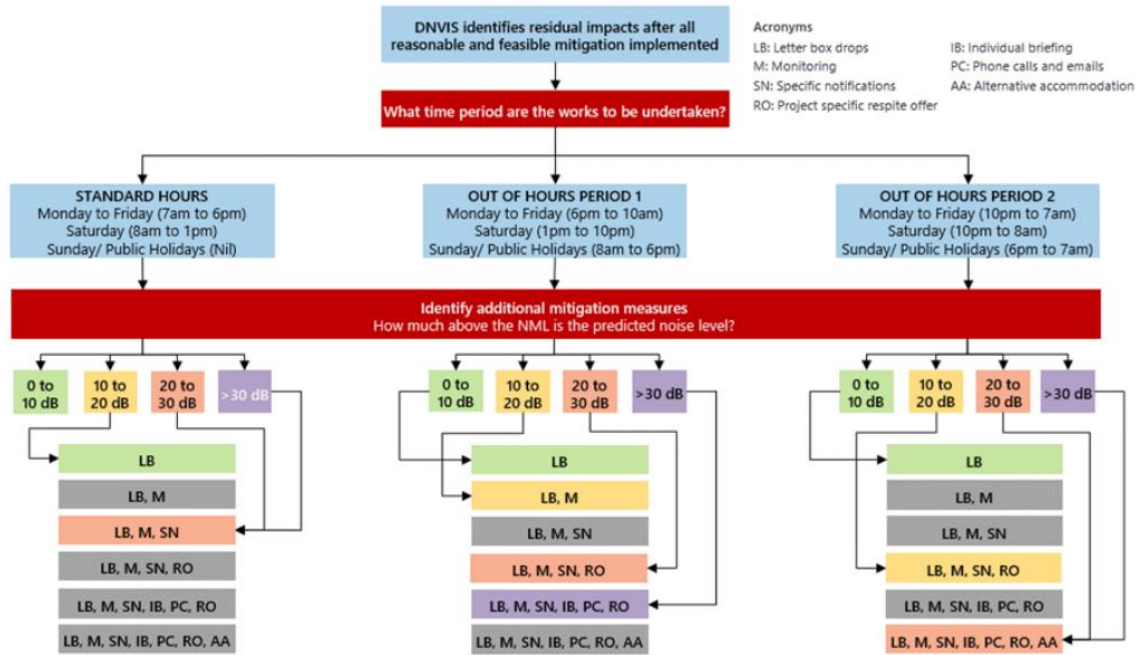
Table 5: Plant Sound Power Levels

| Site | Equipment           | Max LAeq allowed at 7m | On-Site LAeq at 7m |
|------|---------------------|------------------------|--------------------|
| OHE  | 40T excavator       | 90                     | 88                 |
| CMF  | Crane - Fixed       | 88                     | 76.60              |
| CMF  | Crane franner - 20t | 78                     | 75.8               |
| CMF  | Water cart          | 82                     | 75                 |
| OHE  | Concrete Truck      | 84                     | 82                 |
| OHE  | Water cart          | 82                     | 80                 |
| OHE  | 40T excavator       | 90                     | 88                 |
| OHE  | Truck and Dog       | 83                     | 71                 |
| CMF  | Truck and Dog       | 83                     | 76                 |
| OHE  | Truck and Dog       | 83                     | 75                 |
| BSF  | Light vehicle       | 78                     | 62                 |
| BSF  | Franna              | 78                     | 76                 |
| AEC  | 40T excavator       | 90                     | 88                 |
| STM  | Crane - Fixed       | 88                     | 76.60              |
| STM  | Crane franner - 20t | 78                     | 75.8               |



## 4. Additional Mitigation Measures

Section 5 of the CNVS directs that in instances where, after the application of all reasonable and feasible mitigation and management measures, the LAeq(15minute) ground-borne construction noise levels are still predicted to exceed the NMLs, additional ground-borne noise management measures can be applied to further limit the risk of annoyance from construction noise. The CNVS suggests the Project should consider implementing additional mitigation measures such as:



### Additional Mitigation Measures

LB = Letter box drops

M = Monitoring

SN = Specific Notification

RO = Project Specific Respite Offer

IB = Individual Briefing

PC = Phone Calls and Emails

AA = Alternate Accommodation

**OOHW1** is defined as:

- 8:00am to 6:00pm Sunday and public holidays (days).

**OOHW2** is defined as:

- 10:00pm to 7:00am (nights) Monday to Saturday and
- 6:00pm to 8:00am (nights) Sundays and public holidays.



## 5. Discussion

During this reporting period, noise monitoring was conducted to ensure the range of activities being undertaken at the site are measured. This monitoring would target the first opportunity within the first month of starting new tunnelling works as well as during the day, evening and night-time periods throughout construction.

During noise monitoring one exceedance was noted with works stopped and a change to methodology on site implemented. As per the requirements of the DNVIS, when a change in methodology is anticipated to result in a significant change in construction noise, further monitoring was undertaken to confirm. All new activities met the noise requirements.

Throughout the reporting period ten noise complaints and two vibration complaints were received from the community, all of which were investigated and closed out. Monitoring was undertaken when required.



**Annexure A Sitehive Data**

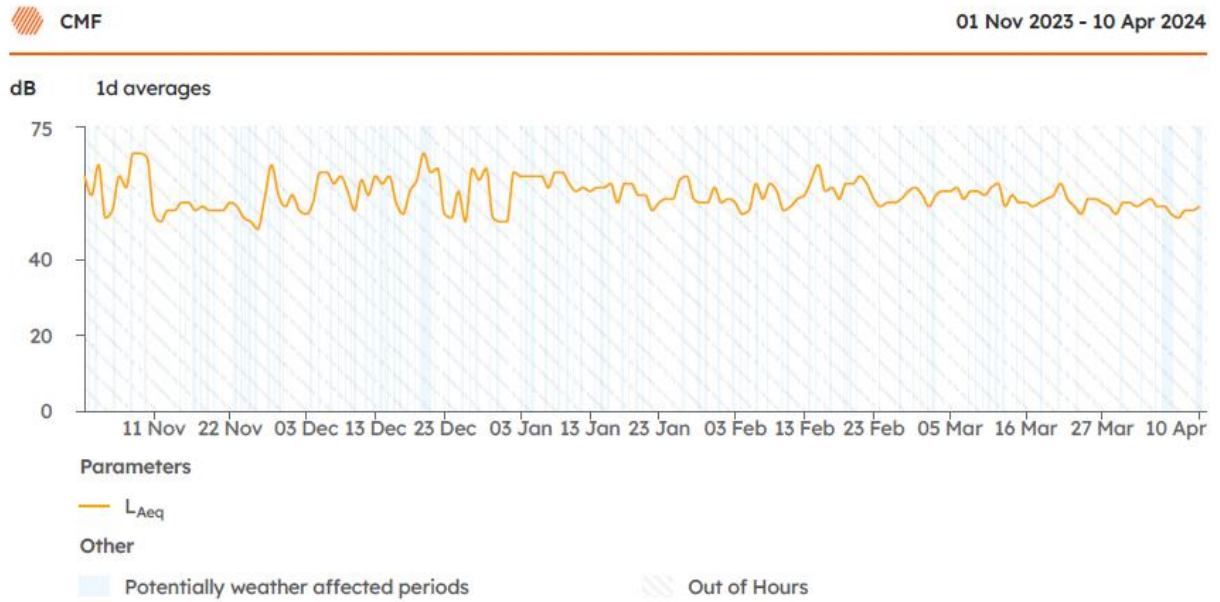


Figure 5:Claremont Sitehive LAqe

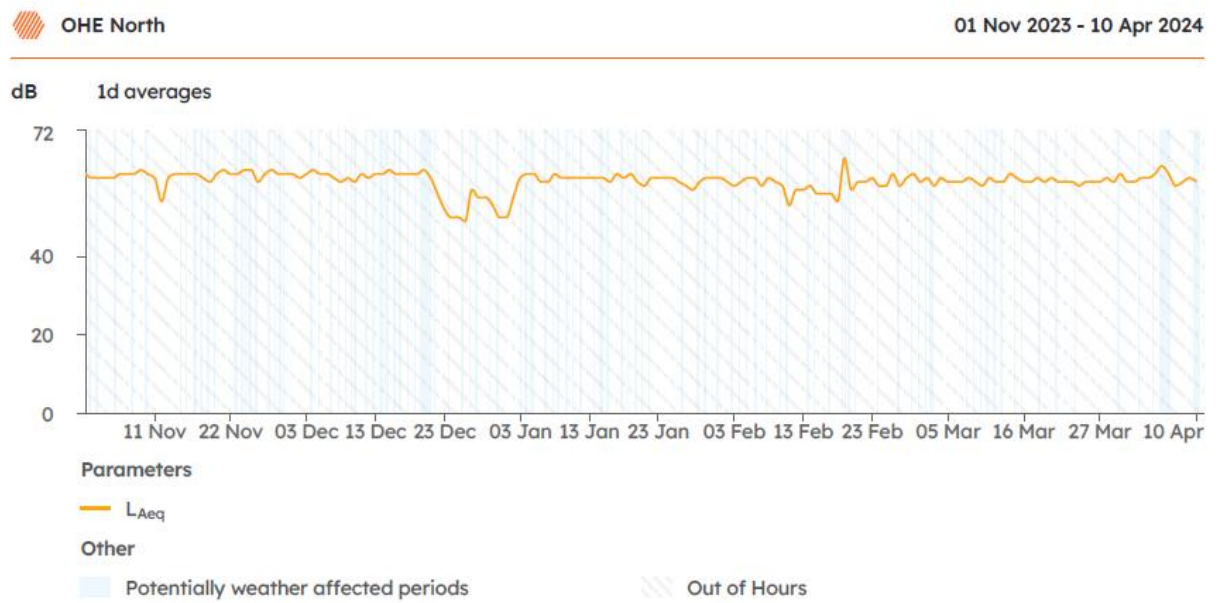


Figure 6:Orchard Hills North Sitehive LAqe

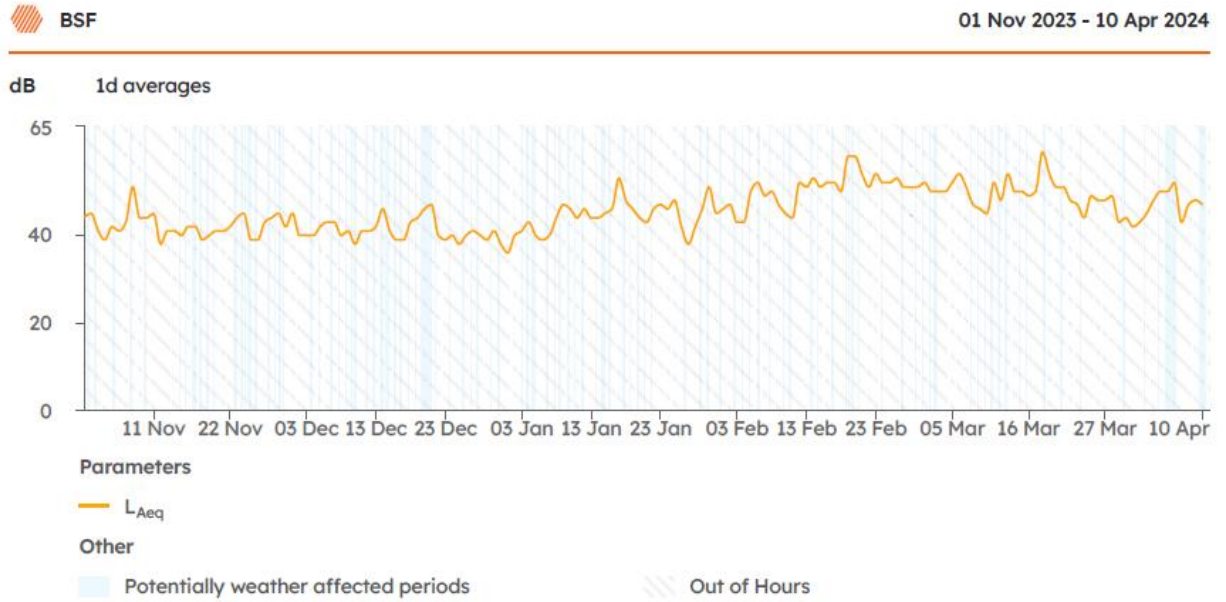


Figure 7: Bringelly Sitehive LAeq



**Annexure B**      Ground-borne noise and vibration validation monitoring report.