Sydney Metro City & Southwest

Construction Monitoring Report – April 2023 to December 2023 Package 5 & 6

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Contents

1. COMPLIANCE MATRIX

Table 1: Project's compliance matrix

Condition	Requirement	Compliance
MCoA C14	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, 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 Construction Monitoring Report

2. INTRODUCTION

This Construction Monitoring Report has been prepared in accordance with Condition C14 of Critical State Significant Infrastructure Planning Approval 8256. It contains the results of Noise and Vibration Monitoring Program and the Water Quality Monitoring Programs, conducted as part of the station upgrades and Metro Services Building (MSB) construction at:

- Dulwich Hill (Package 5)
- Hurlstone Park (Package 6)
- Campsie (Package 5)
- Belmore (Package 6)
- Wiley Park (Package 6)
- Punchbowl (Package 5)

This report details the results of the noise, vibration and surface water monitoring conducted for a period of approximately six (6) months[1] of construction of Package 5 and Package 6 of the Sydney Metro Southwest Project. Construction of these packages commenced on 21 April 2021 and this report details the results of the monitoring undertaken from 8 April 2023 to 6 December 2023. Previous monitoring results for the project have been covered in separate Construction Monitoring Reports.

2.1. Submission Requirements

In accordance with condition the Ministers Conditions of Approval (MCoA) C14, the Construction Monitoring Report will be submitted to the following agencies for information:

- Inner West Council;
- City of Canterbury Bankstown; and
- DPE.

The Independent Environmental Representative for DPE will review the report prior to submission.

[1] The timeframe of the report was extended to capture monitoring events conducted during December 2023, in agreement with Sydney Metro and the project's Environmental Representative.

3. SURFACE WATER MONITORING

The project sites are located within the rail corridor on the T3 Bankstown line between Dulwich Hill and Punchbowl, New South Wales (NSW). The project sites form part of the overall Cooks River catchment with water from the area discharging into the Cooks River via local stormwater drainage or overland flow. The catchment area is highly urbanised with mixed residential, commercial and industrial properties.

The closest Project worksite to an existing watercourse is the Wiley Park Station services building, which is located approximately 100m from an unnamed concrete-lined channel, which forms the upper reaches of Coxs Creek and is identified as a first-order stream within the Cooks River Catchment. Water quality is measured on an ongoing basis for the wider Cooks River catchment by the NSW Department of Planning & Environment (DPE) as part of the Beachwatch programme. The monitoring point is at Kyeemagh Baths at the mouth of the Cooks River in Port Botany. Water quality within the Cooks River catchment is influenced by stormwater, fertilisers, industrial discharges and sewage contamination. Objectives for water quality management during construction are:

- Minimise pollution of surface water through appropriate erosion and sediment control;
- Maintain existing water quality of surrounding surface watercourses.

The water quality monitoring program, in accordance with Table 13 of the SWMP, is to be undertaken quarterly in response to wet weather events (four wet weather events - >20mm of rain per 24 hours - per year), and also including dry weather sampling. Additional surface water monitoring is undertaken during construction to monitor the effectiveness of measures for managing soil and water impacts implemented. It must be conducted for the duration of construction or unless otherwise agreed to by Downer, Sydney Metro and the Independent Environmental Representative for DPE. Details of the Water Quality Monitoring Program and the mitigation measures to reduce the impact of the construction activities are contained within the Soil and Water Management Plans listed below:

- Southwest Metro – Dulwich Hill, Campsie and Punchbowl Station Upgrades Soil and Water Management Plan. This document can be accessed via the Downer Sydney Metro Environment Documents website: Sydney Metro Stations - DT Infrastructure
- Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades Soil and Water Management Plan. This document can be accessed on the Downer Sydney Metro Environment Documents website: Sydney Metro Stations - DT Infrastructure

3.1. Results - Surface Water Monitoring

In accordance with Table 21.4 of the EIS, Vol. 1B, the water quality trigger values relevant for the project are the following:

Table 2: Water quality trigger values

Indicator	Criteria (lowland rivers)
Total phosphorus	50 ug/L
Total nitrogen	500 ug/L
Chlorophyll-a	5 ug/L
Turbidity	6-50 NTU
Salinity (electrical conductivity)	125-2,200 uS/cm
Dissolved oxygen (per cent saturation)	85-110 %
pH	6.5-8.5

A summary of the Surface Water Monitoring Results is contained within the table below. The complete Surface Water Monitoring Reports are contained within Appendixes 1-3. Bold red text indicates initial criteria exceedances.

Table 3: Summary of water monitoring results

Parameter	30/06/2023			15/09/2023			06/12/2023		
	WP1 (upstream)	WP2 (downstream)	WP2-DP1[1] (downstream)	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream)	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream)
Monitoring Event	Dry weather event (mid-construction)			Dry weather event (mid-construction)			Dry weather event (mid-construction)		
Water Depth (m)	0.05	0.08	0.01	0.05	0.05	0.01	0.05	0.05	0.02
pH	7.23	7.65	8.61	6.76	8.86	9.35	7.13	8.01	10.01
Electrical Conductivity **(µS/cm)**	736	1439	741	496.5	622.0	447.9	532	1156	825
Dissolved Oxygen (mg/L)	4.83	6.14	11.13	6.45	6.50	4.25			
Dissolved Oxygen (%)	42.7	57.2	101.1	103.8	70.6	70	22.7	34.4	98.4
SHE[1] Redox Potential (mV)	363.0	408.8	450.7	118.1	147.8	103.5			
Total Suspended Solids (TSS) (mg/L)	<5	<5	<5	9.7	6.6	7.4	<5	<5	<5
Turbidity (NTU)	1.9	1.4	1.1	< 1	< 1	< 1	< 1	7.6	10
Total phosphorus (mg/L)	0.27	0.40	0.46	0.01	0.01	0.06	0.26	0.30	0.18
Total nitrogen (mg/L)	3	4.2	3.9	1	1.1	4.5	1.6	10	2.2
Chlorophyll-a (mg/L)	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0026
Condition	Clear, Low Turbidity	Clear, Low Turbidity	Clear/Light yellow, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear/Light yellow, Low Turbidity
Oil and Grease (mg/L)	<10	<10	<10	<10	<10	<10	<10	<10	28

[2] Discussion of these results are included in Construction Monitoring Report 4 (November 2022 to April 2023), Package 5 - SMCSWSW5-DEW-WEC-EMREP- 001754 and Package 6 - SMCSWSW6-DEW-WEC-EMREP- 001666.

Table 4: Summary of previous monitoring report 4. November 2022 – April 2023.

Parameter	24/05/2022			04/07/2022				21/07/2022				25/08/2022		
	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream)	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream)	WP2-DP2 (downstream)	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream)	WP2-DP2 (downstream)	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream)
Monitoring Event	Wet weather event (mid-construction)			Wet weather event (mid-construction)				Wet weather event (additional pH investigation)				Dry weather event (additional pH investigation)		
Water Depth (m)	0.20	0.25	0.25	0.45	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.25	0.25	0.35
pH	6.82	9.02	10.49	6.87	6.92	10.81	7.29	7.71	7.93	9.76	8.48	7.16	9.02	10.71
Electrical Conductivity **(µS/cm)**	590.0	556.4	502.36	296.3	330.5	400.6	375.5	61.0	108.2	84.1	90.6	805.0	861.0	773.0
Dissolved Oxygen (mg/L)	8.10	8.05	6.22	22.98	8.95	7.63	10.61	7.52	7.13	6.28	6.42	13.50	10.32	4.06
Dissolved Oxygen (%)	85.3	83.2	64.4	73.6	71.3	61.8	67.7	221.8	86.4	73.6	102.6	124.1	101.0	40.8
SHE[1] Redox Potential (mV)	281.7	256.4	175.6	303.7	314	236.6	197.8	422.4	373.5	358.8	370.2	295.2	252.4	230.1
Total Suspended Solids (TSS) (mg/L)	<5	<5	23	11	9	42	26	Not Tested	Not Tested	Not Tested	Not Tested	<5	<5	<5
Turbidity (NTU)	14.0	16.0	18.0	9.4	11.0	14.0	22.0	Not Tested	Not Tested	Not Tested	Not Tested	3.9	3.8	1.2
Total phosphorus (mg/L)	0.16	0.14	0.04	0.06	0.06	0.04	0.14	Not Tested	Not Tested	Not Tested	Not Tested	0.31	0.35	0.11
Total nitrogen (mg/L)	2.5	1.8	3.1	0.48	0.57	3.1	1.68	Not Tested	Not Tested	Not Tested	Not Tested	2.1	1.2	4.6
Chlorophyll-a (mg/L)	< 0.01	< 0.01	< 0.01	0.036	< 0.002	< 0.002	< 0.002	Not Tested	Not Tested	Not Tested	Not Tested	< 0.002	< 0.002	< 0.002
Condition	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity	Clear, Low Turbidity
Oil and Grease (mg/L)	<10	<10	<10	<10	<10	<10	<10	Not Tested	Not Tested	Not Tested	Not Tested	<10	19	13

3.1.1. Construction Quarterly Dry-Weather Event – 30 June 2023

The sampling event was undertaken on 30 June 2023 during a dry-weather event with 0 mm precipitation over the last 24 hours prior to the field sampling (rainfall data was obtained from the closest Bureau of Meteorology weather station:

- Canterbury Racecourse AWS – BOM Station ID: 066194).

All four nominated monitoring locations were inspected (WP1, WP2, WP2-DP1 and WP2-DP2) on 30 June 2023. Three surface water sampling locations (WP1, WP2 and WP2-DP1) were able to be monitored and sampled whereas the WP2-DP2 sampling location was not able to be monitored and sampled due to the dry condition during the time of fieldwork undertaken on 30 June 2023.

Results for the syn-construction dry-weather event sampled on 30 June 2023 generally showed monitored parameters were within the adopted threshold criteria, with the exception of dissolved oxygen, total nitrogen, total phosphorous and pH:

- **Dissolved oxygen** saturation measured at two monitoring locations (WP1 and WP2) were outside the adopted criteria range. **DO** result at the downstream eastern discharge point (WP2-DP1: 101.1%) and downstream sample location (WP2: 57.2%) were higher than the upstream sampling point (WP1: 42.7%). However, it is not considered this is a significant issue based on:
    - DO results at the downstream sampling locations (WP2 and WP2-DP1) were closer to or within the adopted criterion range than the upstream sampling location (WP1).
- **Total nitrogen** measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criterion range with the analytical results of 3.0 mg/L, 4.2 mg/L and 3.9 mg/L for WP1, WP2, and WP2-DP1 respectively. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities undertaken because:
    - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street.
    - It is known that high level of total nitrogen (i.e. an order of magnitude higher than the WP2-DP1 results) was previously identified from this off-site flow contribution.
    - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and fixing. Nevertheless, it is possible that the elevated nutrient levels could be related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.
- **Phosphorous** measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criteria with analytical results of 0.27 mg/L, 0.4 mg/L, and 0.46 mg/L for WP1, WP2, and WP2-DP1 respectively. **Total phosphorus** result at the downstream eastern discharge point (WP2-DP1: 0.46 mg/L) and downstream sample location (WP2: 0.40 mg/L) were slightly higher than the upstream sampling point (WP1: 0.27 mg/L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities undertaken because:
    - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street.
    - It is known that higher level of total phosphorous was previously identified from this off-site flow contribution (0.80 mg/L).
    - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and fixing. Nevertheless, it is possible that the elevated nutrient levels could be

related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.

- **pH** measured at WP1 and WP2 were within the adopted criterion range, whereas pH measured at WP2-DP1 (8.61) was slightly above the adopted criterion range (i.e. 6.5 – 8.5). The **pH** results at downstream eastern discharge point sample (WP2-DP1: 8.61) and downstream sample point (WP2: 7.65) were higher than the results measured at the upstream sample location (WP1: 7.23). However, it is not considered as a significant issue based on:
  - Although pH result at WP2-DP1 was measured slightly higher than the adopted criteria range, pH results of both upstream and downstream samples which were collected from the main stormwater channel (WP1 and WP2) were within the adopted criteria range.
  - As a result of mitigation measures implemented for one of the identified pH sources (i.e. Platform 1 drainage system) and progression of the construction works, the pH levels measured at WP2 and WP2-DP1 were both in a decreasing trend since August 2022.
- **EC** result at the downstream eastern discharge point (WP2-DP1: 741 µS/cm) and downstream sample location (WP2: 1439 µS/cm) were higher than the upstream sampling point (WP1: 736 µS/cm). However, it is not considered this is a significant issue based on:
  - EC results for all three sampling locations (WP1, WP2, WP2-DP1) measured were within the ANZG 2018 / ANZECC 2000 Criteria.

Long-term pH monitoring results (total of 15 monitoring rounds undertaken during the period from March 2021 to June 2023) were assessed. Key findings indicated as following:

- During the period from February 2022 to August 2022, pH exhibited a general increasing trend at WP2 and WP2-DP1. This period overlapped with the period of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings.
- During the period from August 2022 to June 2023, pH exhibited a general decreasing trend at WP2 and WP2-DP1. This period overlapped with periods of:
  - The ending phase of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings.
  - The landscaping works undertaken for the area surrounding the OSD tank.
  - The mitigation and validation work undertaken for the Platform 1 drainage system.

Further details of this investigation work are provided in Appendix 1 of this report.

3.1.2. Construction Quarterly Dry-Weather Event – 15 September 2023

The sampling event was undertaken on 15 September 2023 during a dry-weather event with 0 mm precipitation over the last 24 hours prior to the field sampling (rainfall data was obtained from the closest Bureau of Meteorology weather station:

- Canterbury Racecourse AWS station (ID: 066194)

All 4 nominated monitoring locations were inspected (WP1, WP2, WP2-DP1 and WP2-DP2) on 15 September 2023. A total of 3 surface water sampling locations (WP1, WP2 and WP2-DP1) were able to be monitored and sampled whereas the WP2-DP2 sampling location was not able to be monitored and sampled due to the dry condition during the time of fieldwork undertaken on 15 September 2023.

Results generally showed monitored parameters were within the adopted threshold criteria, with the exception of chlorophyll-a, dissolved oxygen, total nitrogen, total phosphorous, and pH:

- **Chlorophyll-a** measured at WP2-DP1 (4.1 µg/L) was above the adopted criteria, which is consistent with the field observation of the significant algae growth at this discharge point. However, this is not considered to be a significant issue, and this is not considered likely to be a result of the construction activities based on:
    - Chlorophyll-a concentrations measured at both upstream monitoring location (WP1) and downstream monitoring location (WP2) were below the laboratory LOR (<2 µg/L)
    - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that elevated levels of nutrients (nitrogen and phosphorus) were previously identified from this off site flow contribution.
    - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification. Nevertheless, it is possible that the elevated nutrient levels could be related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.
- **Dissolved oxygen** saturation measured at two monitoring locations (WP2-DP1 and WP2) were outside the adopted criteria range. This is not considered to be a significant issue as the dissolved oxygen saturation measured at the downstream monitoring location (WP2) during this syn-construction dry-weather event is closer to the adopted thresholds than the pre-construction baseline event.
- **Total nitrogen** measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criterion range with the analytical results of 1.0 mg/L, 1.1 mg/L and 4.5 mg/L for WP1, WP2, and WP2-DP1 respectively. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities as no work involving soil / ground disturbance was occurring at Wiley Park at the time on monitoring. Nevertheless, it is possible that the elevated nutrient levels could be related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.
- **Total phosphorous** measured at WP2-DP1 (0.06 mg/L) was above the adopted criteria. However, this is not considered to be a significant issue, and this is not considered likely to be a result of the construction activities based on:
    - Total phosphorous concentrations measured at both upstream monitoring location (WP1) and downstream monitoring location (WP2) were below the laboratory LOR (<0.01 mg/L)
    - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that higher level of total phosphorous was previously identified from this off-site flow contribution (0.80 mg/L).
    - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification. Nevertheless, it is possible that the elevated nutrient levels could be related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.
- **pH** measured at WP1 was within the adopted criterion range, whereas pH measured at WP2-DP1 and WP2 (9.35 and 8.86) were above the adopted criterion range (i.e., 6.5 – 8.5). It is possible that the elevated levels could be related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.

Further details of this investigation work are provided in Appendix 2 of this report.

3.1.3. Construction Quarterly Dry-Weather Event – 6 December 2023

The sampling event was undertaken on 6 December 2023 during a dry-weather event with 0 mm precipitation

over the last 24 hours prior to the field sampling (rainfall data was obtained from the closest Bureau of Meteorology weather station:

- Canterbury Racecourse AWS – BOM Station ID: 066194)

All 4 nominated monitoring locations were inspected (WP1, WP2, WP2-DP1 and WP2-DP2) on 6 December 2023. A total of 3 locations (WP1, WP2 and WP2-DP1) were able to be monitored and sampled whereas the WP2-DP2 was not able to be monitored and sampled due to the dry condition during the time of fieldwork undertaken on 6 December 2023.

Results for the syn-construction dry-weather event sampled on 6 December 2023 generally showed monitored parameters were within the adopted threshold criteria, with the exception of dissolved oxygen, total nitrogen, total phosphorous, turbidity and pH:

- **Dissolved oxygen** saturation measured at two monitoring locations (WP1 and WP2) were outside (below) the adopted criteria range and was likely caused by the growth of the grey / dark grey aquatic microorganisms observed. The low dissolved oxygen measured at both locations was not likely to be a result of the construction activities due to:
  - The dissolved oxygen level at WP2-DP1 (i.e., the worksite discharging point) was measured at 98.4% which was within the adopted criteria range.
- **Total nitrogen** measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criterion range with the analytical results of 1.6 mg/L, 10 mg/L and 2.2 mg/L for WP1, WP2 and WP2-DP1 respectively. However, the elevated level of the total nitrogen measured is not considered likely to be a result of the construction activities and is considered likely from two potential off-site sources (potential primary source: the GPT located upstream of WP1 and potential secondary source: urban run-off drainage system at Shadforth Street). Reasonings are provided as following:
  - Based on the total nitrogen level and nitrogen composition reported for the samples collected from the main channel (WP1 and WP2) and the worksite discharge point (WP2-DP1), the GPT located upstream of WP1 is considered as the potential primary source and the urban run-off drainage system at Shadforth Street is considered as the potential secondary source. Verification on the actual source of nutrients could not be identified. The algae growth identified at WP2- DP1 is attributed to this nutrient presence from the unconfirmed source.
- **Phosphorous** measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criteria with analytical results of 0.26 mg/L, 0.30 mg/L, and 0.18 mg/L for WP1, WP2, and WP2- DP1 respectively. However, this is not considered to be a significant issue and this is not considered likely to be a result of the construction activities based on:
  - The comparison outlined in the Report indicates the phosphorous measured from WP1 and WP2 during this syn-construction dry-weather event were at a similar level to the pre-construction result.
  - No significant increase of phosphorous concentrations between WP2 (downstream) and WP1 (upstream). The marginally increase (0.04 mg/L) could result from natural variation or the precision of the laboratory equipment used for the analysis.
  - Phosphorous concentration measured at the worksite discharge point (WP2-DP1) was the lowest among all three monitoring locations.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time that this monitoring event was undertaken, which reflects that the project is in the phase of potential defect(s) identification and rectification. Nevertheless, it is possible that the elevated nutrient levels could be related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.

- **Turbidity** measured at one monitoring location (WP1) was outside the adopted criteria range. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on:
    - The turbidity measured at both downstream monitoring locations (WP2 and WP2-DP1) were both within the adopted criteria range.
    - The turbidity measured at WP1 was below the detection limit (<1 NTU) and less than the floor of the adopted criteria range (6-50) NTU).
- **pH** measured at WP1 and WP2 was within the adopted criterion range, whereas pH measured at WP2-DP1 (10.01) was outside the adopted criterion range (i.e., 6.5 – 8.5). However, it is not considered likely to be a result of the construction activities as no soil/ ground disturbance activities were being undertaken at the time of monitoring. Nevertheless, it is possible that the elevated nutrient levels could be related with the landscaping installed in the batter that surrounds the area in the WP2-DP1 and WP2-DP2 points.
- **Oil and grease** levels were identified to be elevated at WP2-DP1. No plant was being used upstream or in this area by DT Infrastructure, so it is not considered likely to be a result of the construction activities. It is unclear what the source of could be, but potentially the source could come from the rail track located upstream.

The results from the comparison and assessment of upstream and downstream during this syn-construction dry-weather monitoring event, showed the downstream sample point WP2, downstream discharge point (WP2-DP1), and upstream sample point WP1 were either comparable or considered unlikely caused by construction activities within Wiley Park worksite.

Further details of this investigation work are provided in Appendix 3 of this report.

3.2. Discussion - Surface Water Monitoring

DTI conducts regular inspections of the environmental controls, including sediment and erosion controls at Wiley Park to ensure that all sediments and erosion controls are in place, well maintained and functioning correctly. These inspections are conducted by the Project Team and Environmental Team. This proactive approach ensures that environmental controls are functioning properly rather than reactively inspecting the worksite following monitoring and reporting.

The monitored parameters were either within the adopted assessment screening criteria or considered insignificant for the exceedances based on the comparison with the pre-construction baseline monitoring results. However, pH previously measured at the downstream discharge point WP2-DP1 were outside the assessment criteria range of 6.5 to 8.5 and were considered significant, requiring further investigation of the upstream area regarding the potential source(s).

Validation testing was undertaken at the Platform 1 Drainage system on 21 April 2023. Stantec had previously identified soil eroded from an exposed slope at the northeastern end of Platform 1 that had accumulated in the drainpipes as the source of the elevated pH in stormwater flowing through the drainpipes. Stantec recommended cleaning out the soil from the drainage system. DTI cleaned out the drainage system to the extent practicable and Stantec then undertook validation testing of the drainage system to assess the effectiveness of the mitigation measures undertaken.

The validation testing identified that:

- the alkaline soil/ sediment material that had been previously identified within the aco drain was adequately removed and pH measured during the validation testing ranged between 7.12 and 7.44, which is within the applicable assessment criteria range (i.e., 6.5 – 8.5) per the site's Soil and Water Management Plan

- pH measured at the discharge point of Platform 1 drainage system (i.e., Val11-Headwall: pH 7.93) was within the applicable assessment criteria range (i.e., 6.5 to 8.5). However, the increase of the pH measurements observed between location Val10 (pH 7.44) and Val11-Headwall (pH 7.93) suggests that the alkaline soil/ sediment material noted during previous site inspections may have not been removed completely within the two inaccessible drainage pits.
- Due to lack of rainfall and the impracticality of applying tap water directly to the garden bed and station roof, pH levels of the water discharged at these two locations are currently unknown.

Though the pH levels are in a decreasing trend, it is considered that the recorded elevated levels could be related with the addition of a high amount of concrete, as per the Southwest Metro design. This would explain the consistently high levels, which have started to stabilise. An incident report was prepared in relation to this issue. Please note that there hasn't been any environmental harm. Please refer to the incident report on Appendix 15.

For more details on the Validation Report, please refer to Appendix 4.

It is noted that significant algal growth was also identified on site at WP2-DP1, which are attributed to the nutrient presence from an unconfirmed source. The project's consultants in charge of the water testing and reporting have undertaken several site visits to try and identify the source of the nutrients, but with no success.

4. NOISE AND VIBRATION

The area surrounding the project sites contains a variety of land-use types and receivers, including residential, commercial, industrial and sensitive non-residential receivers. These land-uses are mixed within the identified noise catchments, although in general there are clusters of industrial and commercial areas surrounding stations, primarily residential areas between stations. The area surrounding the project sites are affected by rail noise and vibration. The majority of works will occur within the rail corridor, on the station platforms and buildings and within the Metro Services Building Areas, works will mainly occur adjacent to residential properties.

Noise and vibration monitoring must be carried out for the duration of Construction. The predominant reason for monitoring noise and vibration associated with the construction works is to ensure compliance with modelled results for noisy works and to ensure compliance with modelled results and the project's Conditions of Approval(s) and Noise and Vibration Management Plan (NVMP). Modelling undertaken prior to noisy construction activities assesses if Respite Offers (RO) and Alternate Accommodation (AA) are required to be provided to sensitive receivers that are impacted by noise from works conducted outside of standard working hours.

Other reasons to conduct noise and vibration monitoring include:

- In response to noise or vibration complaints;
- If requested by Sydney Metro, the ER, DPE or EPA;
- To augment baseline noise levels, if the noise environment at a receiver is considered to be different from the noise logger locations used for the EIS;
- To validate predicted noise levels associated with each works scenario assessed in the CNVIS, at the commencement of works and new construction activities or location;
- To confirm baseline vibration levels currently experienced at heritage-listed structures and at any vibration-sensitive equipment;
- Where vibration levels are predicted to exceed the vibration screening level, attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure, in accordance with Revised Environmental Mitigation Measure (REMM) NVC12; and
- As part of a plant noise audit.

The methodology and rationale for conducting noise and vibration monitoring is contained within the relevant Noise and Vibration Monitoring Plans, being:

- Southwest Metro – Dulwich Hill, Campsie and Punchbowl Station Upgrades Noise and Vibration Management Plan. This document can be accessed via the Downer Sydney Metro Environment Documents website, https://dtinfrastructure.com.au/wp-content/uploads/2023/11/Noise-and-Vibration-MP_P5_Dulwich_Hill_Campsie_Punchbowl_Rev08_2_230523
- Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades Noise and Vibration Management Plan. This document can be accessed via the Downer Sydney Metro Environment Documents website, IMS Document Template (dtinfrastructure.com.au)https://dtinfrastructure.com.au/wp-content/uploads/2023/11/Noise-and-Vibration-MP_P6_Hurlstone_Park_Belmore_Wiley_Park_Rev08_2_230523.

4.1. Results – Noise Monitoring

The table below contains a summary of the noise monitoring results. The complete reports are provided in Appendices 4 to 11.

Table 5: Summary of noise monitoring results for April 2023 – December 2023 period.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
15/04/2023	TL927-1-39F01 2023 WE42 Noise Monitoring Report (r1) - APPENDIX 5					
57a Ewart Street, Dulwich Hill	Lighting tower and excavator 15.04.2023 07:16pm – 07:31pm	84 (T: Predicted LAeq, 15min for Typical activities)	59	82	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The predicted noise level included high noise impact activities. No high noise impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
65 Ewart Street, Dulwich Hill	Lighting tower and excavator 15.04.2023 07:36pm – 07:51pm	81 (T: Predicted LAeq, 15min for Typical activities)	55	69	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The predicted noise level included high noise impact activities. No high noise impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 15-30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
71 Ewart Street, Dulwich Hill	Lighting tower, jackhammer and excavator 15.04.2023 07:54pm – 08:09pm	83 (T: Predicted LAeq, 15min for Typical activities)	58	77	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured jackhammering works were located approximately 170m away. In the prediction model, the distance between the closest high impact work area and the most affected facade is 50m. - It was noted that the measured works were intermittent.
105 Duntroon Street, Hurlstone Park	Lighting tower, EWP and 2x mobile cranes 15.04.2023 08:21pm – 08:36pm	81 (T: Predicted LAeq, 15min for Typical activities)	61	78	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 10m away. In the prediction model, the distance between the closest work area and the most affected facade is 3m. - It was noted that the measured works were intermittent
5 Railway Street, Dulwich Hill	No construction work was observed during the monitoring period 15.04.2023 08:49pm – 09:04pm	Not applicable (T: Predicted LAeq, 15min for Typical activities)	45	63	Not applicable	No construction work was observed during the monitoring period
46 Floss Street, Hurlstone Park	Lighting tower and mobile crane 15.04.2023 09:12pm – 09:27pm	73 (T: Predicted LAeq, 15min for Typical activities)	54	69	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 70m away. In the prediction model, the distance between the closest work area and the most affected facade is 30m. - It was noted on site that the mobile crane was seen operating however no works were audible during this measurement period.
22/04/2023	TL927-1-40F01 2023 WE43 Noise Monitoring Report (r2) – APPENDIX 6					
41 Urunga Parade, Punchbowl	Vacuum truck and power hand tools 22.04.2023 12:50pm – 01:05pm	65 (H: Predicted LAeq, 15min for High impact activities)	50	72	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The predicted noise level included grinding activity. No grinding works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
4 Richard Street, Punchbowl	Flatbed truck 22.04.2023 01:07pm – 01:22pm	63 (H: Predicted LAeq, 15min for High impact activities)	50	70	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The predicted noise level included grinding activity. No grinding works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. It was noted that the measured works were intermittent.
30 Redman Parade, Belmore	Power hand tool (drill) 22.04.2023 01:55pm – 02:10pm	65 (H: Predicted LAeq, 15min for High impact activities)	62	81	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - It was noted that the measured works were intermittent. - It was noted that the road traffic on Redman Parade and Burwood Road was the dominating noise source during the measurement.
1 Acacia Street, Belmore	EWP and flatbed Truck 22.04.2023 02:16pm – 02:31pm	65 (H: Predicted LAeq, 15min for High impact activities)	52	71	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - It was noted that the site office buildings were providing shielding to the measured works. - It was noted that the measured works were intermittent.
13-15 Anglo Road, Campsie	Generator, excavator, power hand tool (grinder) and hydrema 22.04.2023 02:41pm – 02:56pm	71 (H: Predicted LAeq, 15min for High impact activities)	67	75	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured grinding works were located approximately 65m away. In the prediction model, the distance between the closest grinding work area and the most affected facade is 20m.
2 Wilfred Avenue, Campsie	Power hand tools, hand tools and EWP 22.04.2023 03:03pm – 03:18pm	54 (H: Predicted LAeq, 15min for High impact activities)	61	85	No	The measured LAeq, 15min is above the predicted noise level. This can be attributed to: - Other contractors working in the green shaded area (as shown in Appendix A.3). - EWP and power hand tool works occurring in the green shaded area (as shown in Appendix A.3) which were not Downer works.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
32-34 Campsie Street, Campsie	Hand tools and EWP 22.04.2023 03:22pm – 03:37pm	50 (H: Predicted LAeq, 15min for High impact activities)	57	75	No	The measured LAeq, 15min is above the predicted noise level. This can be attributed to: - Other contractors working in the green shaded area (as shown in Appendix A.3). - EWP and power hand tool works occurring in the green shaded area (as shown in Appendix A.3) which were not Downer works.
5 Railway Street, Hurlstone Park	Power hand tools and forklift 22.04.2023 03:55pm – 04:10pm	78 (H: Predicted LAeq, 15min for High impact activities)	51	74	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
105 Duntroon Street, Hurlstone Park	EWP, power hand tools and pressure washer 22.04.2023 04:16pm – 04:31pm	84 (H: Predicted LAeq, 15min for High impact activities)	62	80	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 10m – 50m away. In the prediction model, the distance between the closest jackhammering work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
3A Commons Street, Hurlstone Park	Power hand tools 22.04.2023 04:37pm – 04:52pm	82 (H: Predicted LAeq, 15min for High impact activities)	52	77	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 70m away. In the prediction model, the distance between the closest jackhammering work area and the most affected facade is 10m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
57a Ewart Street, Dulwich Hill	Mobile crane, power hand tools and EWP 22.04.2023 05:06pm – 05:21pm	83 (H: Predicted LAeq, 15min for High impact activities)	54	74	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 30m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 5m. It was noted that the measured works were intermittent.
65 Ewart Street, Dulwich Hill	Mobile crane, EWP, lighting tower and hand tools 22.04.2023 05:22pm – 05:37pm	81 (H: Predicted LAeq, 15min for High impact activities)	55	69	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 10m – 80m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 20m. It was noted that the measured works were intermittent.
71 Ewart Street, Dulwich Hill	Lighting tower 22.04.2023 05:39pm – 05:54pm	84 (H: Predicted LAeq, 15min for High impact activities)	57	76	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - Only the lighting tower was audible at this monitoring location. - The measured works were located approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
71 Ewart Street, Dulwich Hill	Lighting tower, brickstacking 22.04.2023 07:17pm – 07:32pm	84 (H: Predicted LAeq, 15min for High impact activities)	53	71	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 15m – 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent. -
65 Ewart Street, Dulwich Hill	Lighting tower, brickstacking and excavator 22.04.2023 07:34pm – 07:49pm	81 (H: Predicted LAeq, 15min for High impact activities)	54	73	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 25m – 35m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 20m. - It was noted that the measured works were intermittent.
57a Ewart Street, Dulwich Hill	Lighting tower, EWP and hand tools 22.04.2023 07:52pm – 07:07pm 22.04.2023 08:33pm – 08:48pm	83 (H: Predicted LAeq, 15min for High impact activities)	52	65	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - The measured works were located approximately 30m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
13-15 Anglo Road, Campsie	Generator 22.04.2023 07:52pm – 07:07pm 22.04.2023 08:33pm – 08:48pm	71 (H: Predicted LAeq, 15min for High impact activities)	62	78	No	The measured LAeq, 15min is lower than the predicted noise level. This can be attributed to: - The predicted noise level included grinding activity. No grinding works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled plants. - It was noted on site that no works were occurring other than the generator operating.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
06/05/2023	TL927-1-41F01 2023 WK45 Noise Monitoring Report (r1) – APPENDIX 7					
57A Ewart Street, Dulwich Hill	EWP (x2), hydrema (idling) 06.05.2023 01:19pm – 01:35pm	80 (H: Predicted LAeq, 15min for High impact activities)	58	73	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The predicted noise level included grinding activity. No grinding works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - Noise from use of hand tools occurred within the station building. - The hydrema was not operating under load. - No high impact plant was operating during the measurement. - The measured works were located approximately 23m - 41m away. In the prediction model, the distance between the closest work area and the most affected facade is 8m. - It was noted that the measured works were intermittent. -
51 Ewart Lane, Dulwich Hill	EWP (x2), hydrema (idling), hand tools (non-powered) 06.05.2023 01:42pm – 01:57pm	78 (H: Predicted LAeq, 15min for High impact activities)	61	70	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - Noise from use of hand tools occurred within the station building. - The hydrema was not operating under load. - No high impact plant was operating during the measurement. - The measured works were located approximately 11m – 32m away. In the prediction model, the distance between the closest work area and the most affected facade is 9m. - It was noted that the measured works were intermittent.
67 Ewart Street, Dulwich Hill	Hydrema (idling), hand tools (nonpowered) 06.05.2023 02:05pm – 02:20pm	80 (H: Predicted LAeq, 15min for High impact activities)	52	70	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - Noise from use of hand tools occurred within the station building. - The hydrema was not operating under load. - No high impact plant was operating during the measurement. - Works occurred predominately around the station building. - The measured works were located approximately 75m - 92m away. In the prediction model, the distance between the closest work area and the most affected facade is 7m. - It was noted that the measured works were intermittent. -

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
32-34 Campsie Street, Campsie	15t excavator with bucket attachment, hand tools 06.05.2023 02:56pm – 03:11pm	68 (H: Predicted LAeq, 15min for High impact activities)	52	68	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - Works around the concourse including grinders were inaudible during the monitoring period. The measured works were located approximately 112m away. In the prediction model, the distance between the closest work area and the most affected facade is 31m. Works at the end of the platform were low impact activities and intermittent in nature.
13-15 Anglo Road, Campsie	Generator, drop saw, positrack, hand tools (non-powered) 06.05.2023 03:21pm – 03:36pm	74 (H: Predicted LAeq, 15min for High impact activities)	64	71	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. The measured works were located approximately 33m – 57m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m. - It was noted that the measured works including saw cutting were intermittent.
2 Wilfred Avenue, Campsie	Hand tools, positrack 06.05.2023 03:46pm – 04:04pm	69 (H: Predicted LAeq, 15min for High impact activities)	53	72	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - Works around the concourse including grinders were inaudible during the monitoring period. The measured works were located approximately 36m – 53m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m. Works at the end of the platform were low impact activities and intermittent in nature.
5 Railway Street, Hurlstone Park	Light vehicles, hand tools 06.05.2023 04:29pm – 04:44pm	76 (H: Predicted LAeq, 15min for High impact activities)	48	71	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were located approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent. -

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
105 Duntroon Street, Hurlstone Park	Mobile crane, EWP (x2), power tools, light vehicles 06.05.2023 04:54pm – 05:09pm	81 (H: Predicted LAeq, 15min for High impact activities)	61	81	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The mobile crane and EWP did not operate continuously under high load. - The majority of noise generating plant e.g. mobile crane engine and EWP engines were located below the monitoring location on the platform with indirect line of sight. - The measured works were located approximately 23m – 41m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
32-34 Campsie Street, Campsie	Positrack, generator, light vehicles 06.05.2023 05:44pm – 05:59pm	68 (H: Predicted LAeq, 15min for High impact activities)	54	78	No	The measured LAeq, 15min is below with the predicted noise level. This can be attributed to: - The predicted noise level included grinding activity. No grinding works were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - Observed operating plant such as light vehicles and a positrack occurred down Lillian Lane and were inaudible during the monitoring period. - The measured works were located approximately 180m – 250m away. In the prediction model, the distance between the closest work area and the most affected facade is 31m. - Observed operating plant were low impact activities and intermittent in nature.
20/05/2023	TL927-1-42F01 2023 WK47 Noise Monitoring Report (r1) – APPENDIX 8					
41 Urunga Parade, Punchbowl	EWP (idling) and hand tools 20.05.2023 01:02pm – 01:17pm	65	64	73	No	The measured LAeq, 15min is below the predicted noise level. It was noted on site that the measured works were intermittent.
1A Shadforth Street, Wiley Park	Power chisel 20.05.2023 01:23pm – 01:38pm	55	55	70	No	The measured LAeq, 15min is consistent with the predicted noise level. It was noted on site that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
30 Redman Parade, Belmore	Vacuum cleaner 20.05.2023 01:49pm – 02:04pm	50	61	83	No	The calculated LAeq, 15min contribution from the construction works is below the predicted noise level. It was noted on site: - This monitoring location was dominated by traffic noise from Burwood Road. - The measured works were barely audible over the traffic noise.
13-15 Anglo Road, Campsie	Generator, powered drill and hand tools 20.05.2023 02:15pm – 02:30pm	76	64	74	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured generator was approximately 9m away and the measured hammering and drilling was approximately 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. - It was noted that the measured works excluding the generator were intermittent. - Noise blankets were installed around the generator.
2 Wilfred Avenue, Campsie	Excavator and handheld hammer 20.05.2023 02:38pm – 02:53pm	69	61	78	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were located approximately 30m – 60m away. In the prediction model, the distance between the closest work area and the most affected facade is 15m. - It was noted that the measured works including handheld hammering were intermittent.
32-34 Campsie Street, Campsie	EWP, telehandler and excavator 20.05.2023 02:55pm – 03:10pm	68	54	76	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The measured works were located approximately 35m – 60m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m. - It was noted that the measured works were intermittent. - Telehandler operated for periods of time behind site buildings breaking line of sight to the monitoring location.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
105 Duntroon Street, Hurlstone Park	EWP and hand tools 20.05.2023 03:39pm – 03:54pm	81	60	79	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were located approximately 5m-10m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. - It was noted that the measured works were intermittent.
3A Commons Street, Hurlstone Park	Power hand tools 20.05.2023 04:00pm – 04:15pm	79	61	81	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The noise generating plants were located below the monitoring location on the platform at a lower ground level than the monitoring location, with no line of sight. - The measured works were located approximately 40m – 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 10m.
57A Ewart Street, Dulwich Hill	Delivery truck, telehandler and hi-rail excavator 20.05.2023 04:49pm – 05:04pm	80	59	87	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The delivery truck operated at a distance of 5m from the monitoring location for 2 minutes and moved to a distance of 20m away from the monitoring location. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
63 Ewart Street, Dulwich Hill	Delivery truck, hi-rail excavator and hand tools 20.05.2023 05:06pm – 05:21pm	79	51	70	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were located approximately 20m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
57A Ewart Street, Dulwich Hill	Lighting tower and excavator 20.05.2023 06:26pm – 06:41pm	80	55	67	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were located approximately 20m-50m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works including the excavator were intermittent.
63 Ewart Street, Dulwich Hill	Lighting tower and Excavator 20.05.2023 06:42pm – 06:57pm	79	68	90	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured excavator works was a passby in front of the monitoring location. The passby duration was approximately one minute and no further excavator noise was audible. - It was noted that the measured works excluding the lighting tower were intermittent.
1 Ewart Lane, Dulwich Hill	Road saw, excavator with rock hammer and handheld hammer 20.05.2023 08:00pm – 08:15pm	78	71	82	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The measured works were located approximately 35m-50m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - The measured works were located below the monitoring location on the platform at a lower ground level than the monitoring location, with no line of sight.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
57A Ewart Street, Dulwich Hill	Road saw, excavator with rock hammer and grinder 20.05.2023 08:16pm – 08:31pm	80	64	75	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The measured works were located approximately 40m-55m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - The measured works were located below the monitoring location on the platform at a lower ground level than the monitoring location, with no line of sight.
08/07/2023-09/07/2023	TL927-1-43F01 2023 July Noise Monitoring Report (r1) – APPENDIX 9					
51 Ewart Street, Dulwich Hill	Excavator, hand tools & generator 08.07.2023 12:42pm – 12:57pm	88	57	78	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 20m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. - It was noted that the measured works excluding the generator were intermittent. -
57A Ewart Street, Dulwich Hill	Generator 08.07.2023 01:03pm – 01:18pm	87	57	74	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 19m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m.
1A Shadforth Street, Wiley Park	Hand tools, handheld pneumatic hammer & generator 08.07.2023 01:56pm – 02:11pm	55	70	82	Yes	The measured LAeq, 15min is above the predicted noise level. This can be attributed to: - Wiley Park predictions were modelled using the TfNSW model. This included hand tools (no impact) and a cement mixer, However it did not include the handheld pneumatic hammer which was used on site. - Noise blankets were in the process of being installed throughout the measurement period.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
1A Shadforth Street, Wiley Park	Hand tools & handheld pneumatic hammer 08.07.2023 02:59pm – 03:14pm	55	65	78	Yes	The measured LAeq, 15min is above the predicted noise level. This can be attributed to: - Wiley Park predictions were modelled using the TfNSW model. This included hand tools (no impact) and a cement mixer, However it did not include the handheld pneumatic hammer which was used on site. - Noise blankets were installed; however, it is recommended that they should be installed vertically as opposed to horizontally. - It was noted on site that the existing platform building was partially shielding the works.
2 Hopetoun Street, Hurlstone Park	Excavator & hand Tools 08.07.2023 03:44pm – 03:59pm	70	55	73	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 3m. - It was noted that the measured works were intermittent.
105 Duntroon Street, Hurlstone Park	Excavator, asphalter & Hand tools 08.07.2023 04:06pm – 04:21pm	81	62	86	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
3 Wilfred Avenue, Campsie	Hand tools, power hand tools & generator 08.07.2023 04:45pm – 05:00pm	65	61	91	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 37m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works excluding the generator were intermittent.
13-15 Anglo Road, Campsie	Generator 08.07.2023 05:11pm – 05:26pm	74	64	76	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. - Noise blankets were installed around the generator.
57A Ewart Street, Dulwich Hill	Generator, hand tools & delivery truck 09.07.2023 11:07am – 11:23am	87	60	82	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 37m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. - It was noted that the measured works excluding the generator were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
51 Ewart Street, Dulwich Hill	Generator, power hand tools, excavator & delivery truck 09.07.2023 11:24am – 11:39am	84	62	80	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 7m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. - It was noted that the measured works excluding the generator were intermittent.
65 Ewart Street, Dulwich Hill	Generator & hand tools 09.07.2023 11:43am – 11:58am	86	58	79	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. - It was noted that the measured works excluding the generator were intermittent.
46 Floss Street, Hurlstone Park	Excavator 09.07.2023 12:08pm – 12:23pm	73	56	74	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 69m away. In the prediction model, the distance between the closest work area and the most affected facade is 9m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
105 Duntroon Street, Hurlstone Park	Multicrane & hand tools 09.07.2023 12:54pm – 01:09pm	81	61	87	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. - It was noted that the measured works were intermittent.
3 Wilfred Avenue, Campsie	Power hand tools &excavator 09.07.2023 01:28pm – 01:43pm	65	63	90	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
32-34 Campsie Street, Campsie	Power hand tools, hydrema & excavator 09.07.2023 01:45pm – 02:00pm	65	61	87	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 39m away. In the prediction model, the distance between the closest work area and the most affected facade is 9m. - It was noted that the measured works were intermittent.
13-15 Anglo Road, Campsie	Generator & power hand tools 09.07.2023 02:08pm – 02:23pm	74	62	79	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. - It was noted that the measured works excluding the generator were intermittent. - Noise blankets were installed around the generator.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
30 Redman Parade, Belmore	Power hand tools 09.07.2023 02:41pm – 02:56pm	50	63	83	No	The calculated LAeq, 15min contribution from the measured works is consistent with the predicted noise level. The following notes were taken during the measurement: - Road traffic on Burwood Road was the dominating noise source during this measurement. - The measured works were barely audible over the constant road traffic on Burwood Road. - The measured works were intermittent. -
5 Bedford Crescent, Dulwich Hill	Lighting tower 13.07.2023 10:42pm – 10:57pm	62	51	78	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 17m away. In the prediction model, the distance between the closest - work area and the most affected facade is 11m. - Noise blankets were installed around the lighting tower.
3 Bedford Crescent, Dulwich Hill	Lighting tower & power hand tools 13.07.2023 10:58pm – 11:13pm	61	58	82	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 18m away. In the prediction model, the distance between the closest work area and the most affected facade is 8m. - It was noted that the measured works excluding the lighting tower were intermittent. - Noise blankets were installed around the lighting tower.
57A Ewart Street, Dulwich Hill	Power hand tools 15.07.2023 12:53pm – 01:08pm	87	62	80	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 20m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
51 Ewart Street, Dulwich Hill	Power hand tools 15.07.2023 01:10pm – 01:25pm	84	64	77	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 19m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. - It was noted that the measured works were intermittent.
10 Dudley Street, Dulwich Hill	Power hand tools 15.07.2023 01:33pm – 01:48pm	70	62	78	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 102m away. In the prediction model, the distance between the closest work area and the most affected facade is 19m. - It was noted that the measured works were intermittent.
3 Wilfred Avenue, Campsie	Hi-rail excavator 15.07.2023 02:23pm – 02:38pm	65	54	69	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 37m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
32-34 Campsie Street, Campsie	Hi-rail excavator 15.07.2023 02:40pm – 02:55pm	65	54	77	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 35m away. In the prediction model, the distance between the closest - work area and the most affected facade is 9m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
13-15 Anglo Road, Campsie	Generator & hand tools 15.07.2023 03:04pm – 03:19pm	74	60	82	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. - It was noted that the measured works excluding the generator were intermittent. - Noise blankets were installed around the generator.
51 Ewart Lane, Dulwich Hill	Compressor, lighting tower (x2) (blankets fitted), truck generator 19.07.2023 08:38pm – 08:53pm	53	61	77	Yes	The measured LAeq, 15min is above the predicted noise level. This can be attributed to: - Different plant and equipment operating during the measurement compared to the modelled prediction. - Compressor and truck generator were not fitted with noise blankets. - The following particular site sources were noted during the monitoring period: o Truck generator and compressor operating: 60-61 dB(A) during steady operation. o Compressor cycling and generator operating: 61-62 dB(A), compressor cycled for 2.5 minutes over 15 minute period. o Ambient noise environment was influenced by constant operational noise from the truck generator and compressor. - It is noted that without the 10dB(A) reduction in the modelled prediction, the measured LAeq, 15min is expected to be 2 dB(A) less than the predicted noise level. - Subsequent to the measurement, the site engineer instructed to install noise blankets around the truck generator to potentially reduce the noise source.

51 Ewart Lane, Dulwich Hill	Compressor (air valve releases), lighting tower (x2) (blankets fitted), truck generator, mixing drill 19.07.2023 09:35pm – 09:50pm	53	63	78	Yes	The technician arrived on site, where works were being undertaken in an unapproved/unassessed location, which later resulted in an NCR for the project. Nonetheless, the technician undertook noise measurements to find that the measured LAeq, 15min was above the predicted noise level for that piece of plant in relation to the levels that were modelled for the approved location. The elevated noise levels can be attributed to: - Location of plant being modelled for a different location, hence no prediction of elevated noise levels were ever modelled for this location. - Different plant and equipment operating during the measurement compared to the modelled prediction (noting the prediction was made for a different location). Analysis of the noise levels were made in relation to the levels predicted for the approved location, as no other modelling was available at the time. - Compressor was not fitted with noise blankets as the noise source was approximately 2.5m above ground level and deemed not feasible. - The following particular site sources were noted during the monitoring period: o Noise blankets were installed around the truck generator noise source. o Truck generator and compressor operating: 59-60 dB(A) during steady operation. o Compressor cycling and generator operating: 60-61 dB(A), compressor cycled for 2.5 minutes over 15 minute period. o Air valve releases: 71-73 dB(A), air releases occurred for 7.5 minutes over 15 minute period. o Air valve releases and mixing drill: 71-74 dB(A). o The fitted noise blankets were observed to provide a 1 dB(A) reduction at the monitoring location. Higher measured LAeq, 15min during this measurement compared to M26 measurement can be attributed to air valve releases from the compressor. o Ambient noise environment was influenced by constant operational noise from the truck generator and compressor, As well as releases from the air valve. - It is noted that without the 10dB(A) reduction in the modelled prediction, the measured LAeq, 15min is expected to be consistent with the predicted noise level (noting modelling was undertaken for a different location). - After the measurement, the site engineer discussed with the site supervisor and work crew possible feasible and reasonable noise

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
						mitigation strategies. It was explained to the site engineer that it was not possible to immediately stop works. The site engineer instructed the work crew and site supervisor to orientate the truck containing the generator and compressor away from residences where feasible during the works and that noise blankets were to be fitted around the truck generator in all work areas.
5 Bedford Crescent, Dulwich Hill	Lighting tower (blankets fitted) 19.07.2023 10:16pm – 10:31pm	57	52	64	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - Only a lighting tower with noise blankets was operating near the monitoring location during this measurement. - The following particular site source was noted during the monitoring period: o Lighting tower with noise blankets operating: 50-51 dB(A) steady operation.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
51 Ewart Lane, Dulwich Hill	Compressor (air valve releases), lighting tower (x2) (blankets fitted), truck generator 19.07.2023 10:46pm – 11:01pm	53	62	77	Yes	This measurement was conducted in response to a complaint received by the site supervisor from a resident in 51 Ewart Lane, Dulwich Hill. The measured LAeq, 15min is above the predicted noise level. This can be attributed to: - Different plant and equipment operating during the measurement compared to the modelled prediction. - Compressor was not fitted with noise blankets as the noise source was approximately 2.5m above ground level and deemed not feasible. - The following particular site sources were noted during the monitoring period: o Noise blankets were installed around the truck generator noise source o Truck generator and compressor operating: 59-60 dB(A) during steady operation. o Compressor cycling and generator operating: 60-61 dB(A), compressor cycled for 2.5 minutes over 15 minute period. o Air valve releases: 70-76 dB(A) air releases occurred for 5.5 minutes over 15 minute period. o The fitted noise blankets were observed to provide a 1 dB(A) reduction at the monitoring location. Higher measured LAeq, 15min during this measurement compared to M26 measurement can be attributed to air valve releases from the compressor. o Ambient noise environment was influenced by constant operational noise from the truck generator and compressor, As well as releases from the air valve. - It is noted that without the 10dB(A) reduction in the modelled prediction, the measured LAeq, 15min is expected to be 1 dB(A) less than the predicted noise level.
26/08/2023	TL927-1-44F01 2023 WE09 Noise and Vibration Monitoring Report (r1) – APPENDIX 10					
2 Shadforth Street, Wiley Park	Power hand tools 26.08.2023 09:16am – 09:31am	69	48	64	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 100m away. In the prediction model, the distance between the closest work area and the most affected facade is 25m. - It was noted that the measured works were intermittent. -

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
1-3 Shadforth Street, Wiley Park	Power hand tools and light vehicles 26.08.2023 09:35am – 09:50am	73	54	97	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m.It was noted that the measured works were intermittent.
2/1 Cornelia Street, Wiley Park	Power hand tools 26.08.2023 09:53am – 10:08am	68	46	64	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 150m away. In the prediction model, the distance between the closest work area and the most affected facade is 35m. - It was noted that the measured works were intermittent.
105 Duntroon Street, Hurlstone Park	Generator, power hand tools and EWP 26.08.2023 10:32am – 09:47am	81	62	75	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. It was noted that the measured works excluding the generator were intermittent. - It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
107 Duntroon Street, Hurlstone Park	Generator and power hand tools 26.08.2023 10:48am – 11:03am	76	62	74	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 35m away. In the prediction model, the distance between the closest work area and the most affected facade is 25m. - It was noted that the measured works excluding the generator were intermittent. - It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.
109 Duntroon Street, Hurlstone Park	Generator and power hand tools 26.08.2023 11:06am – 11:21am	75	56	75	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 40m. - It was noted that the measured works excluding the generator were intermittent. - It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.
71 Ewart Street, Dulwich Hill	Power/non-power hand tools, delivery trucks and excavator 26.08.2023 11:31am – 11:46am	89	65	88	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works excluding the delivery truck were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
67-69 Ewart Street, Dulwich Hill	Power/non-power hand tools, delivery trucks and EWP 26.08.2023 11:48am – 12:03pm	86	62	92	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works excluding the delivery truck were approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured were intermittent.
57A Ewart Street, Dulwich Hill	Power/non-power hand tools, delivery trucks, EWP, excavator and concrete agi 26.08.2023 12:05pm – 12:20pm	86	70	87	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. - Less plant and equipment operating during the measurement compared to the modelled prediction. - It was noted that the measured were intermittent.
23/09/2023	TL927-1-45F01 2023 WE13 Noise and Vibration Monitoring Report (r1) – APPENDIX 11					
105 Duntroon Street, Hurlstone Park	Non-powered handtools, excavator with bucket and light vehicles 23.09.2023 09:14am - 09:29am	75	58	76	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - Works were undertaken within the station concourse which provided shielding to the monitoring location. - It was noted that the measured works were intermittent. -

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
107 Duntroon Street, Hurlstone Park	EWP, excavator with bucket and nonpowered and power handtools 23.09.2023 09:30am - 09:45am	72	59	75	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 45m away. In the prediction model, the distance between the closest work area and the most affected facade is 30m. - Works were undertaken within the station concourse which provided shielding to the monitoring location. - It was noted that the measured works were intermittent.
6 Hopetoun Street, Hurlstone Park	Vacuum truck, excavator with bucket 23.09.2023 09:59am - 10:14am	75	63	81	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 35m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
7 Bedford Crescent, Dulwich Hill	Generator, flat bed truck with crane arm, grinder and excavator with bucket 23.09.2023 10:34am - 10:49am	83	61	74	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - The measured works were approximately 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 35m. - It was noted that the measured works excluding the generator were intermittent. - It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
244 Wardell Road, Dulwich Hill	Excavator with bucket, non-powered handtools and flat bed truck with crane arm 23.09.2023 10:54am - 11:09am	85	67	78	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact plants were used during the monitoring period. - The measured works were approximately 50m away. In the prediction model, the distance between the closest work area and the most affected façade is 30m. - It was noted that the measured works were intermittent.
51 Ewart Lane, Dulwich Hill	Excavator with bucket, flat bed truck with crane arm, plate compactor and bench saw 23.09.2023 11:14am - 11:29am	83	74	81	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - It was noted that the measured works were intermittent. - It was noted that the bench saw location had no line of sight to the monitoring location.
30/09/2023	TL927-1-46F01 2023 WE14 Noise Monitoring Report (r1) – APPENDIX 12					
244 Wardell Road, Dulwich Hill	Power and nonpowered Hand tools 30.09.2023 08:04am - 08:19am	85	67	88	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 30m. - It was noted that the measured works were intermittent. -

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
7 Bedford Crescent, Dulwich Hill	Power hand tools and excavator with bucket attachment 30.09.2023 08:24am - 08:39am	83	56	74	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 60m away. In the prediction model, the distance between the closest work area and the most affected facade is 35m.
51 Ewart Lane, Dulwich Hill	Trucks, power hand tools and excavator with bucket attachment 30.09.2023 08:51am - 09:06am	83	67	88	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 20-70m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m.
21/10/2023	TL927-1-47F01 2023 WE17 Noise and Vibration Monitoring Report (r1) – APPENDIX 13					
5 Bedford Crescent, Dulwich Hill	Hi-rail excavator and power/non-power handtools 21.10.2023 01:48pm - 02:03pm	76	55	74	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.
57A Ewart Street, Dulwich Hill	Light vehicle, power/non-power handtools and hi-rail excavator 21.10.2023 02:10pm - 02:25pm	74	58	80	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level		Above predicted noise level	Comments
			$L_{Aeq(15min)}$	L_{Amax}		
244 Wardell Road, Dulwich Hill	Power/non-power handtools 21.10.2023 02:29pm - 02:44pm	73	66	82	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 25m. - It was noted that the measured works were intermittent.
105 Duntroon Street, Hurlstone Park	Mobile crane and power/non-power handtools 21.10.2023 02:57pm - 03:12pm	81	59	80	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. - The measured crane works were at a lower ground level than the monitoring location. As a result, the works were shielded. - It was noted that the measured works were intermittent.
107 Duntroon Street, Hurlstone Park	Mobile crane and power/non-power handtools 21.10.2023 03:15pm - 03:30pm	76	52	69	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The measured works were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - The measured crane works were at a lower ground level than the monitoring location. As a result, the works were shielded. - It was noted that the measured works were intermittent.
3A Commons Street, Hurlstone Park	Power/non-power Handtools 21.10.2023 03:40pm - 03:55pm	79	50	73	No	The measured LAeq, 15min is below the predicted noise level. This can be attributed to: - The measured works were approximately 70m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - The measured crane works were at a lower ground level than the monitoring location. As a result, the works were shielded. - It was noted that the measured works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
41 Urunga Parade, Punchbowl	Generator 11.11.2023 09:48am - 10:03am	52	54	77	No	The Downer construction contribution LAeq,15min is below the predicted noise level. The following observations were made on site: - Downer platform works (hand tools and EWPs) approximately 170m away were inaudible at the monitoring location. - Given the construction noise (Downer works) was not audible at this monitoring location, the contribution from the construction works can be assumed to be 10dB below the measured LAeq,15min. As a result, the contribution from the Downer works can be calculated to be 44 dB(A), which is below the predicted noise level of 52 dB(A). - There was a site office generator from John Holland site producing a constant noise source of LAF 48-49 dB(A). -
5 Bedford Crescent, Dulwich Hill	Light vehicle and EWP 11.11.2023 10:37am - 10:52am	76	60	73	No	The measured LAeq,15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 3-55m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that the measured EWP works were intermittent.
7 Bedford Crescent, Dulwich Hill	Power/non-power handtools and EWP 11.11.2023 10:53am - 11:08am	75	55	77	No	The measured LAeq,15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 15-50m away. In the prediction model, the distance between the closest work area and the most affected facade is 7m. - It was noted that the measured EWP works were intermittent.

Assessment Point	Measured Plant	Predicted noise level dB(A)	Measured noise level $L_{Aeq(15min)}$	Measured noise level L_{Amax}	Above predicted noise level	Comments
57A Ewart Street, Dulwich Hill	Generator 11.11.2023 11:17am - 11:32am	74	62	77	No	The measured LAeq,15min is below the predicted noise level. This can be attributed to: - Less plant and equipment operating during the measurement compared to the modelled prediction. - No high noise impact equipment was used during the monitoring period. - The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. - It was noted that there were noise blankets installed around the generator.

4.2. Results – Vibration Monitoring

The sections below contain a summary of the vibration monitoring results. The complete reports are provided in Appendix 8. The established criteria for cosmetic damage in the Sydney Metro Construction Noise and Vibration Statement is as follows:

- Reinforced or framed structures: 25.0 mm/s;
- Unreinforced or light framed structures: 7.5 mm/s;
- Heritage structures (structurally sound): 7.5 mm/s; and
- Heritage structures (structurally unsound): 2.5 mm/s.

Also, in accordance with the Hurlstone Park Station Vibration Monitoring Plan developed in consultation with the Project consulting structural engineers (Appendix 14), the established vibration limits for the affected garage structure at a residential property on Commons Street are shown below:

- Greater than or equal to 4 mm/s (cosmetic damage is possible);
- Greater than or equal to 8 mm/s (cosmetic damage becoming more likely).

During the reporting period, vibration monitoring was undertaken at the following locations:

Table 6: Vibration monitoring for April 2023 – December 2023

	Date	Location	Reference
1	26/08/2023 – 26/08/2023 08:30am -11:30am	Dulwich Hill Station concourse	Appendix 10
2	23/09/2023 – 24/09/2023 08:30am – 02:00pm	Dulwich Hill platform station building	Appendix 11
3	21/10/2023 – 22/10/2023 1:30pm -1:00pm	Dulwich Hill Station concourse	Appendix 13

4.2.1. Dulwich Hill Station Concourse – 26/08/2023

The results of the unattended vibration measurements for the station concourse at Dulwich Hill presented below:

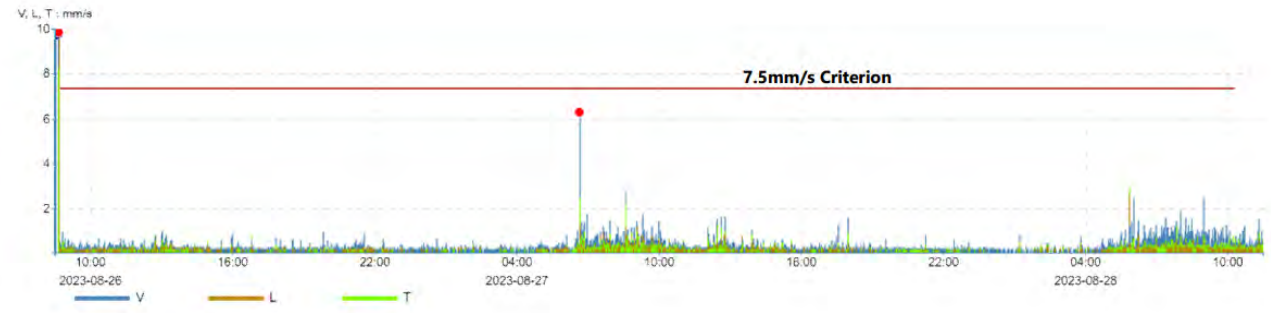

Figure 2 – Unattended vibration monitoring results for Dulwich Hill Station concourse on 26/08/2023 between 08:30am - 11:30am

In accordance with the Package 5 Noise and Vibration Monitoring Plan, the vibration levels produced from the vibration intensive works in proximity to the station concourse were below the 7.5mm/s criterion for heritage structures.

Table 7: Exceedances table

Exceedance ID	Date and Time	Cause of exceedance
N/A		

4.2.2. Dulwich Hill Platform Station Building –23/09/2023 – 24/09/2023

The results of the unattended vibration measurements for the platform station building at Dulwich Hill presented below:

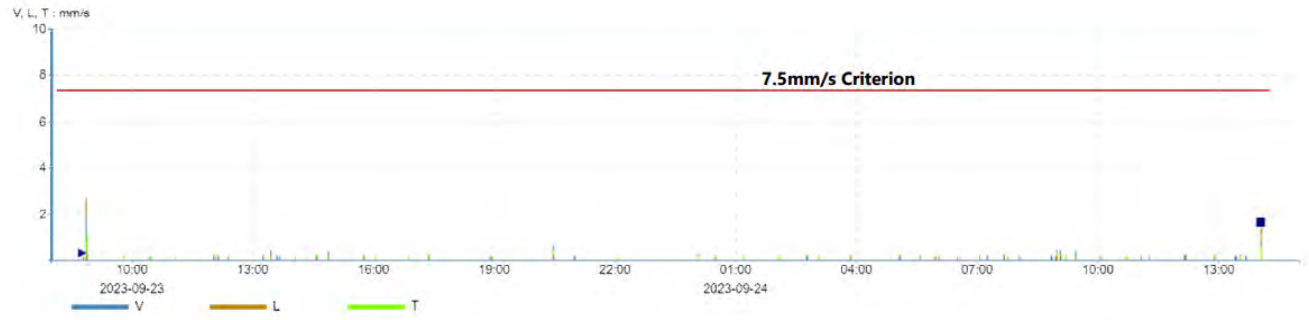

Figure 3 – Unattended vibration monitoring results for Dulwich Hill platform station building on 23/09/2023 – 24/09/2023

In accordance with the Package 5 Noise and Vibration Monitoring Plan, the vibration levels produced from the vibration intensive works in proximity to the platform building were below the 7.5mm/s criterion for heritage structures. Therefore, the risk of cosmetic damage from the measured works is assessed as low.

Table 8: Exceedances table

Exceedance ID	Date and Time	Cause of exceedance
N/A		

4.2.3. Dulwich Hill Station Concourse – 21/10/2023 – 22/10/2023

The results of the unattended vibration measurements for the station concourse at Dulwich Hill presented below:

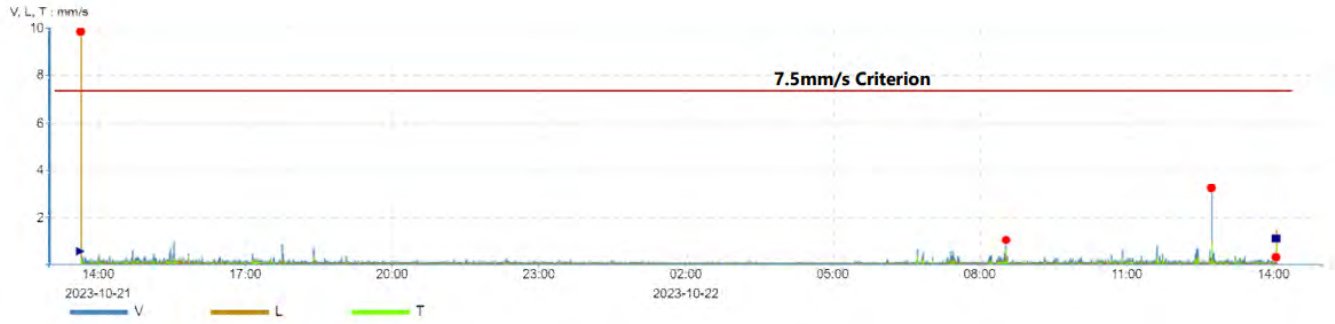

Figure 4 – Unattended vibration monitoring results for Dulwich Hill Station concourse on 21/10/2023 – 22/10/2023 between 1:30pm - 1:00pm

In accordance with the Package 5 Noise and Vibration Monitoring Plan, the vibration levels produced from the vibration intensive works in proximity to the station concourse were below the 7.5mm/s criterion for heritage

structures except for one instance which was due to the installation of the monitor. Therefore, the risk of cosmetic damage is assessed as low.

Table 9: Exceedances table

Exceedance ID	Date and Time	Cause of exceedance
N/A		

4.3. Discussion – Noise and Vibration Monitoring

The results of the noise measurements were typically below or consistent with the predicted noise levels for the works. There were seven (7) instances where the results of the noise measurements were above the predicted noise levels. Two measurements that exceeded the predicted noise level were related to cumulative noise effects caused by other contractors working close to DTI's works.

Two (2) noise level measurements were taken at Wiley Park on the 8th July 2023 identified noise levels above the predicted due to the use of a handheld pneumatic hammer. The first measurement was undertaken while noise blankets were being installed by the team. The second measurement undertaken showed the noise blankets were mildly successful in reducing the noise levels; nevertheless, the noise consultant recommended these to be installed vertically rather than horizontally. Although noise levels were higher than predicted, it was noted on site that the existing platform building was partially shielding the works, thus partially mitigating the noise impacts.

The three (3) measurements taken on the 19th July 2023, where exceedances were identified at Dulwich Hill, were related to the same scope of works, but in an area not assessed in the OOH permit. The results from the noise monitoring were analysed relative to the existing noise model prediction for the plant in use at the approved location. The noise consultant worked with the site team in an effort to reduce the noise impacts, but noise levels were identified to still be over the predicted for the plant. This resulted in an NCR for the project, not for the exceedance per se, but for working in an area not assessed in the OoHW application process. Investigations undertaken by the environmental team concluded that this issue was caused by a break in communication that resulted in the plant used to undertake the works being placed in a different area to the one assessed in the OoHW application, which meant the risks associated with this activity were not identified. The team was toolboxed on the issue and on the importance of clear communication to avoid reoccurrence.

For the majority of occurrences, the noise monitoring results demonstrated that the provision of construction noise mitigation measures was appropriate.

The results of the unattended vibration measurements were typically below the established vibration screening criterion for heritage structures. Therefore, the risk of cosmetic damage from the measured works is assessed as low.

It should also be noted that DTI conducts regular inspections of the environmental controls, including noise and vibration mitigation measures, across all work sites. These inspections are conducted by the Project Team and the Environmental Team. This proactive approach aims to ensure that environmental controls are functioning properly rather than reactively inspecting the worksite following monitoring, reporting or complaints.

APPENDIX 1 – SURFACE WATER MONITORING REPORT WILEY PARK STATION – 30 JUNE 2023

Surface Water Monitoring Report - Wiley Park Station

Construction-Phase Quarterly Dry-Weather Event (30 June 2023)

9 July 2024

Prepared for:

Downer EDI Works Pty Ltd

Prepared by:

Stantec Australia

Revision	Description	Author		Quality Check		Independent Review	
RevA	Draft	Chong Zeng	21/07/2023	Mike Jorgensen	21/07/2023	N/A	N/A
Rev0	Final		09/07/2024		09/07/2024	Callum Laker	09/07/2024

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Abbreviations

MSB	Metro Services Building
SWMP	Soil and Water Management Plan
DO	Dissolved oxygen
EC	Electrical conductivity
pH	Potential of hydrogen
ORP	Oxidation-reduction potential
NATA	National Association of Testing Authorities, Australia
QA/QC	Quality assurance/quality control
TSS	Total Suspended Solids
CoA	Conditions of Approval
DQO	Data Quality Objective
DQIs	Data Quality Indicators
RPD	Relative Percentage Difference
LORs	limits of reporting
CoC	Chain-of-Custody

Glossary and Unit

NTU	Nephelometric Turbidity Units
µS/cm	MicroSiemens per Centimeter
µg/L	Microgram per Liter

1.0 INTRODUCTION

1.1 BACKGROUND

Stantec Australia Pty Ltd ("Stantec" – formerly Cardno) was commissioned by Downer EDI Works Pty Ltd ("Downer EDI") to undertake monitoring and reporting of surface water quality of the unnamed channel near the Wiley Park Station Upgrade worksite. The proposed upgrade includes the upgrade of the main station and installation of the Metro Services Building (MSB).

Surface water quality of the channel near the Wiley Park Upgrade Site is to be monitored as per the requirements summarised in the **Table 1-2**, which is excerpted from the Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades Soil and Water Management Plan (SWMP). The monitoring program was prepared to meet the requirements outlined in The Sydney Metro City and Southwest – Sydenham to Bankstown Upgrade Conditions of Approval SSi-8256, specifically Condition 8 to Condition 10. The sampling locations (WP1 – Upstream and WP2 – Downstream) of the water quality monitoring are shown on **Figure 1** in **Appendix A**. In order to establish a more robust dataset of how the downstream discharge from the worksite affects the water quality, Downer EDI requested two additional sampling locations at the downstream discharge points (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) of the water quality monitoring since May 2022. This additional sampling at the downstream discharge points is subject to the flow contribution at the time of each monitoring event. Refer to **Figure 1** in **Appendix A** for approximate locations of the sampling locations.

The closest Project worksite to an existing watercourse is the Wiley Park Station services building, which is located approximately 100 m from an unnamed concrete-lined channel, which forms the upper reaches of Coxs Creek and is identified as a first-order stream.

For the purpose of establishing baseline water quality data within the first-order stream at Wiley Park, water quality monitoring was intended to be undertaken for a period prior to construction of the Wiley Park services building as outlined in the Table 13 of the SWMP. At a minimum, one dry-weather sample and one wet weather sample (weather permitting) were intended to be collected during the pre-construction period. The frequency of pre-construction water quality monitoring within this channel was subject to water being present within the structure. However, during the baseline monitoring period no wet-weather event was able to be captured prior to commencement of construction. A dry-weather baseline monitoring event was undertaken on 10 March 2021.

This report presents the findings from the sixteenth surface water monitoring event, which was undertaken by Stantec on 30 June 2023. The event undertaken was a construction-phase quarterly dry-weather event. **Table 1-1** below summarised the surface water monitoring events undertaken to date by Stantec.

Table 1-1 Summary of Surface Water Monitoring Event Undertaken to Date

Date of Monitoring	Type of Event	Report Reference
10 March 2021	Pre-construction Dry Baseline	4NE30187_R001_SWM_WileyPark_Rev0
20 March 2021	Construction-Phase Wet Weather	4NE30187_R001_SWM_WileyPark_Rev0
5 May 2021	Construction-Phase Wet Weather	4NE30187_R002_SWM_WileyPark_Rev0
1 July 2021	Construction-Phase Dry Weather	NE30161_R003_SWM_WileyPark_Rev0
30 September 2021	Construction-Phase Dry Weather	NE30161_R004_SWM_WileyPark_Rev0
12 November 2021	Construction-Phase Wet Weather	NE30161_R005_SWM_WileyPark_Rev0
26 November 2021	Construction-Phase Wet Weather	NE30161_R005_SWM_WileyPark_Rev0
9 and 10 February 2022	Construction-Phase Dry Weather	NE30161_R006_SWM_WileyPark_Rev0
23 February 2022	Construction-Phase Wet Weather	NE30161_R007_SWM_WileyPark_Rev0
9 March 2022	Construction-Phase Wet Weather	NE30161_R008_SWM_WileyPark_Rev0
24 May 2022	Construction-Phase Wet Weather	NE30161_R009_SWM_WileyPark_Rev0
4 and 21 July 2022	Construction-Phase Wet Weather	304100142_R010_SWM_WileyPark_Rev0
25 August 2022	Construction-Phase Dry Weather	304100142_R011_SWM_WileyPark_Rev0
25 November 2022	Construction-Phase Dry Weather	304100142_R012_SWM_WileyPark_Rev0
22 February 2023	Construction-Phase Wet Weather	304100142_R013_SWM_WileyPark_Rev0
30 June 2023	Construction-Phase Dry Weather	304100142_R014_SWM_WileyPark_Rev0

1.2 PURPOSE AND OBJECTIVE

The purpose of the surface water monitoring works is to monitor and record surface water quality within the unnamed channel in accordance with the monitoring program as outlined in the Site's SWMP. The objective of the works is to evaluate whether construction activities are impacting water quality downstream of the project footprint in the unnamed channel. The evaluation entailed comparing water quality of samples collected upstream of the worksite discharge points with water quality downstream of the discharge points.

1.3 SCOPE OF WORKS

Stantec undertook the following tasks during the surface water monitoring event:

- Inspected and sampled the two nominated surface water sampling locations (WP1 – Upstream and WP2 – Downstream) on 30 June 2023 as a construction-phase quarterly dry-weather monitoring event.
- Inspected two additional nominated downstream discharge points locations (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) and sampled on one of the additional nominated downstream discharge point locations (WP2-DP1) on 30 June 2023 as part of construction-phase quarterly dry-weather monitoring event. No sampling work was undertaken at the downstream discharge point – WP2-DP2 due to dry condition.
- Recorded field parameters (measured using a calibrated water quality meter) and noted observations of the water bodies during sampling. Field parameters measured included:
  - Dissolved oxygen (DO).

  - Electrical conductivity (EC).
  - Potential of hydrogen (pH).
  - Oxidation-reduction potential (ORP).
  - Temperature.
- Collected three primary surface water samples from WP1, WP2 and WP2-DP1, one intra-lab duplicate sample and one inter-lab duplicate sample per sampling event for submission to a laboratory accredited by the National Association of Testing Authorities, Australia (NATA) for the requested analytical testing of primary and additional quality assurance/quality control (QA/QC) samples. Samples were submitted for analysis of:
  - Oil & Grease.
  - Total Suspended Solids (TSS).
  - Nutrients (Total Phosphorous, Total Nitrogen).
  - Turbidity.
  - Chlorophyll-a.
- Reviewed the analytical and field data and prepared this report.

Details of the monitoring program are shown below in the **Table 1-2**, which is excerpted from the Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades SWMP.

Table 1-2 Wiley Park Water Quality Monitoring Program

Wiley Park Water Quality Monitoring Program	
Waterway	Sydney Water Cooks River Channel (first-order stream)
Indicative inspection and / or monitoring points	WP1 – upstream
	WP2 – downstream
	WP2-DP1- downstream eastern discharge point
	WP2-DP2 – downstream western discharge point
Interaction with project works	Channel near the Wiley Park service building site
Pre-construction works	Monthly for parameters detailed in Table 11 of the site's SWMP (including at least one dry-weather round of sampling). One wet-weather event, if possible, for the parameters detailed in Table 11, subject to event occurrence, safe conditions for monitoring and access being available to conduct monitoring. Note: A wet-weather event is when the receiving area has received greater than 20 mm of rain in 24 hours. The sampling was undertaken immediately during construction hours and if it is safe to do so.
During construction of the Wiley Park services building	Quarterly for parameters detailed in Table 11 of the site's SWMP (including during dry weather). Four wet-weather events per year for the parameters in Table 11, subject to event occurrence, safe conditions for monitoring and access being available to conduct monitoring. Note: A wet-weather event is when the receiving area has received greater than 20mm of rain in 24 hours. The sampling was undertaken immediately during construction hours and if it is safe to do so.

2.0 GUIDELINES AND LEGISLATION

There are a range of Guidelines and Legislation and Conditions of Approval (CoA) that are applicable to the surface water monitoring program that are summarised below.

The CoA applicable to this job include:

- The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Conditions of Approval SSI-8256, determined 12 December 2018.

The State and Federal legislation and policy and guidelines that apply to the program include:

- Environmental Planning and Assessment Act 1979 (EP&A Act).
- Contaminated Land Management Act 1997.
- Protection of the Environment Operations Act 1997 (POEO Act).
- Water Management Act 2000 Water Management (General) Regulation 2018.

Additional guidelines and standards to the management of soil and water include:

- Landcom (2004). Managing Urban Stormwater: Soils and Construction. (Volume 1 of the 'Blue Book').
- DECC (2008). Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction. (Volume 2D of the 'Blue Book').
- ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the 'ANZECC Guidelines').
- ANZECC (2018). Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting (collectively known as the 'ANZECC Guidelines').
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines').

3.0 MONITORING AND INSPECTION LOCATIONS

Details of the inspection and / or monitoring locations are provided in **Table 3-1**. The approximate locations are provided in **Appendix A**. Representative photographs are presented in **Appendix B**.

Table 3-1 Surface Water Monitoring Location Details

Sample Location	Approx. Latitude	Approx. Longitude	Description
WP1 (up-stream)	-33.924014	151.065315	Immediately south of the Boulevarde and east of 118 the Boulevarde.
WP2 (down-stream)	-33.923339	151.064970	Immediately north of the Urunga Parade and west of 4 Urunga Parade.
WP2-DP1 (downstream eastern discharge point)	-33.923543	151.065058	Immediately south of the Urunga Parade, east side of the channel, approximately 20 m south of WP2.
WP2-DP2 (downstream western discharge point)	-33.923529	151.065048	Immediately south of the Urunga Parade, west side of the channel, approximately 20 m south / upstream of WP2.

4.0 QUALITY MANAGEMENT

The Data Quality Objective (DQO) process is used to establish a systematic planning approach to setting the type, quantity and quality of data required for making decisions based on the environmental condition of the project area. The DQO process involves the seven steps detailed in **Table 4-1**.

Table 4-1 Data Quality Objectives

DQO	Description
Step 1 State the Problem	Construction work may adversely impact the local surface water quality within the unnamed channel near the site.
Step 2 Identify the Decisions	Are there any impacts to surface water quality from construction activities at the site?
Step 3 Identify Inputs to the Decision	The primary inputs to the decisions described above are: • Assessment of surface water quality of the unnamed channel within proximity to Wiley Park service building site per the requirements outlined in the site's SWMP, with samples collected from the nominated monitoring locations (upstream and downstream of the site); • Laboratory analysis of surface water samples for relevant parameters; • Assessment of the suitability of the analytical data obtained, against the Data Quality Indicators (DQIs); • Assessment of the analytical results against applicable guideline criteria; and • Aesthetic observations of surface water bodies, including odours, sheen and condition, if encountered.
Step 4 Define the Study Boundaries	The lateral extent of the study area is the channel near the Wiley Park service building site. The temporal boundaries of the study comprises the duration of the monitoring program, including pre-construction monitoring, construction phase, and post-construction monitoring as required.
Step 5 Develop a Decision Rule	The decision rules for the water quality monitoring sampling events included: • Were primary and QA/QC samples analysed using methods endorsed by relevant regulatory guidelines at laboratories NATA-accredited for the requested analyses? • Did the field and laboratory QA/QC results indicate that the data set was reliable and representative of the water quality with Relative Percentage Difference (RPD) values of 30% or less? • Were the laboratory limits of reporting (LORs) below the applicable guideline criteria for the analysed parameters? • Were guideline criteria sourced from endorsed guidelines? • Were surface water aesthetic characteristics evaluated including odours and sheen? • Were the monitoring results obtained from the downstream sample collected during construction phase greater than the upstream sample collected during the same monitoring event? If so, then the adverse impact to the quality of water in the unnamed channel is considered to have potentially occurred.
Step 6 Specify Limits on Decision Error	In accordance with the relevant guidelines as endorsed under the Contaminated Land Management Act 1997. Specific limits for this project are in accordance with the appropriate guidance made or endorsed by state and national regulations, appropriate indicators of data quality, and standard procedures for field sampling and handling. This step also examines the certainty of conclusive statements based on the available new Site data collected. This should include the following points to quantify tolerable limits:

DQO	Description
	• A decision can be made based on a certainty assumption of 95% confidence in any given data set (excluding asbestos). A limit on the decision error will be 5% that a conclusive statement may be a false positive or false negative. A decision error in the context of the decision rule presented above would lead to either underestimation or overestimation of the risk level associated with a particular sampling area. Decision errors may include: • Sampling errors may occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the Site. To address this, minimum numbers of samples are proposed to be collected from each media. As such, there may be limitations in the data if aspects of the sampling plan cannot be implemented. Some examples of this scenario include but not limited to: – Proposed samples are not collected due to lack of water flow or access being restricted to a given location. • Limitations in ability to acquire useful and representative information from the data collected. The data are proposed to be collected from multiple locations and sample media. • Measurement errors can occur during sample collection, handling, preparation, analysis and data reduction. To address this the following measures are proposed: – Field staff to follow a standard procedure when undertaking samples, including decontamination of tools, removal of adhered soil to avoid false positives in results, collection of representative samples and use of appropriate sample containers and preservation methods. – Laboratories to follow a standard procedure when preparing samples for analysis and undertaking analysis. – Laboratories to report quality assurance/ quality control data for comparison with the DQIs established for the project
Step 7 Optimise the Design for Obtaining Data	To achieve the DQOs and DQIs, the following sampling procedures were implemented to optimise the design for obtaining data: • Surface water samples was collected from upstream and downstream sampling locations, as available due to access and water level; • Surface water samples was collected from two (2) discharge points between upstream and downstream, as available due to access and water level; • Surface water parameters were selected based on project monitoring requirements provided to Stantec; • Samples were collected by suitably qualified and experienced environmental scientists; • Samples were collected and preserved in accordance with relevant standards/guidelines; and • Field and laboratory QA/QC procedures were adopted and reviewed to indicate the reliability of the results obtained.

4.1 DATA QUALITY INDICATORS

The following DQIs have been adopted for the project. The DQIs outlined in **Table 4-2** assist with decisions regarding the usefulness of the data obtained, including the quality of the laboratory data.

Table 4-2 Summary of Data Quality Indicators

Data Quality Indicator	Frequency	Data Acceptance Criteria
Completeness		
Field documentation correct	All samples	The work was documented in accordance with Stantec SOPs
Suitably qualified and experience sampler	All samples	Person deemed competent by Stantec collecting and logging samples

Data Quality Indicator	Frequency	Data Acceptance Criteria
Appropriate lab methods and limits of reporting (LORs)	All samples	Samples were analysed using methods endorsed by relevant regulatory guidelines at laboratories NATA-accredited for the requested analyses.
Chain of custodies (COCs) completed appropriately	All samples	The work was documented in accordance with Stantec SOPs
Sample holding times complied with	All samples	The samples were extracted and analysed within holding times specified by the project NATA-accredited laboratory
Proposed/critical locations sampled	-	Proposed/critical locations sampled
Comparability		
Consistent standard operating procedures for collection of each sample. Samples should be collected, preserved and handled in a consistent manner	All samples	All works undertaken in accordance with Stantec SOPs
Experienced sampler	All samples	Person deemed competent by Stantec collecting and logging samples
Climatic conditions (temp, rain etc) recorded and influence on samples quantified (if required)	All samples	Climatic conditions documented in field sheets
Consistent analytical methods, laboratories and units	All samples	Sample analysis to be in accordance with NATA-approved methods
Representativeness		
Sampling appropriate for media and analytes (appropriate collection, handling and storage)	All samples	Sample analysis to be in accordance with NATA-approved methods
Samples homogenous	All samples	All works undertaken in accordance with Stantec SOPs
Detection of laboratory artefacts, e.g. contamination blanks	-	Laboratory artefacts assessed and impact on results determined
Samples extracted and analysed within holding times	All samples	The samples were extracted and analysed within holding times specified by the laboratory
Precision		
Blind duplicates (intra-laboratory duplicates)	1 per 20 samples	Less than or equal to 30% RPD No Limit RPD result less than 10 × LOR
Split duplicates (inter-laboratory duplicates)	1 per 20 samples	Less than or equal to 30% RPD No Limit RPD result less than 10 × LOR
Laboratory duplicates	1 per 20 samples	Results greater than 10 x LOR:less than or equal to 30% RPD Results less than 10 x LOR: No limit on RPD
Accuracy (Bias)		
Surrogate spikes	All organic samples	50-150%
Matrix spikes	1 per 20 samples	70-130%
Laboratory control samples	1 per 20 samples	70-130%

Data Quality Indicator	Frequency	Data Acceptance Criteria
Method blanks	1 per 20 samples	Less than LOR

The DQOs and DQIs for the project were met during the monitoring events. Discussion of the Quality Control / Quality Assurance assessment is provided in **Appendix E**.

5.0 FIELD INVESTIGATION

The scope and method of the surface water monitoring is summarised in **Table 5-1**.

Table 5-1 Investigation Activity Summary

Activity	Details
Dates of Fieldwork	30 June 2023
Surface Water Inspection and Monitoring	All four nominated locations outlined in **Section 3.0** were inspected during the course of the field work undertaken on 30 June 2023 with three nominated locations monitored including WP1 – upstream, WP2 – downstream, WP2-DP1 – downstream eastern discharge point. No monitoring was undertaken at WP2-DP2 (downstream western discharge point) due to the dry condition at WP2-DP2 at the time of fieldwork undertaken. Stantec undertook the inspection and/or monitoring per the following procedures: Surface water body inspection - The general site condition was inspected prior to commencement of field works for signs of any site activities that may have altered the surface water contamination status or require modifications to the field or laboratory works program. Each nominated location was inspected for indicators of contamination and the presence as well as the flow of surface water. This information is recorded on the field sheets presented in **Appendix C**. Surface water sampling – Subject to the flow contribution at each nominated location during the field work undertaken, field parameters and visual/olfactory observations were recorded prior to sampling at each nominated location. Physico-chemical parameters including pH, electrical conductivity (EC), dissolved oxygen (DO), reduction-oxidation potential (redox), and temperature were measured using a calibrated water quality meter. Surface water samples were collected either directly into the sampling bottle or directly from the telescopic scoop. Once field parameters were recorded, the surface water samples were transferred to appropriately preserved sample containers provided by the laboratories. Field observations, and parameters are presented in **Appendix C**. Surface water samples were placed into an Esky containing ice and maintained at or below 4°C whilst onsite and in transit to the NATA-accredited laboratories for the targeted analyses.
Surface Water Analysis	Surface water samples from the monitoring event were submitted under standard chain-of-custody (CoC) procedures to NATA-accredited Eurofins Environment Testing Australia analysis of the parameters as follows: • Oil & Grease; • Total Suspended Solids (TSS); • Nutrients (Total Phosphorous, Total Nitrogen); • Turbidity; and • Chlorophyll-a. Tabulated laboratory results are presented in **Appendix D**. The Data QA /QC program and data quality review including calibration certificates is presented in **Appendix E**. Copies of the original laboratory reports, NATA-stamped laboratory certificates, and CoC documentation are included in **Appendix F**.
Decontamination	In the event of reusable sampling or monitoring equipment (telescopic scoop, water quality meter) was used decontamination was undertaken. Decontaminated between locations using a standard bucket wash. Equipment was washed in phosphate-free detergent (Liquinox) and rinsed in laboratory supplied rinsate water.

6.0 SURFACE WATER ASSESSMENT CRITERIA

The assessment criteria for surface water analytical and field data were adopted from Table 11 of the site's SWMP. The criteria for selected parameters are provided in **Table 6-1** below. ANZECC guideline criteria are included in the table for reference.

Table 6-1 Water Quality Monitoring Parameters and Adopted Criteria at Wiley Park

Parameter	ANZECC Criteria – Freshwater[1]	Proposed Trigger Values	Proposed Actions
Temperature (°C)	>80% ile; <20% ile	Downstream results are greater than upstream results in rainfall events up to and including the significant event threshold of greater than 20 mm in 24 hours. Downstream results are greater than upstream results during dry-weather sampling.	Environment Manager (or delegate) to re-test to confirm results and undertake an inspection of the adjacent works and propose actions where required.
Dissolved Oxygen (DO)	Lower limit – 85% Upper limit -110%		
Turbidity (NTU)	6-50 NTU		
Oil and grease	-		
pH	Lower limit – 6.5 Upper limit – 8.5		
Salinity (as EC)	125 – 2200 µS/cm		
Total Suspended Solids (TSS)	-		
Total Phosphorus as P	25 µg/L		
Total Nitrogen as N	350 µg/L		
Chlorophyll-a	3 µg/L		

Note to Table

1 ANZECC guideline criteria are included for reference. It is noted that for dry weather events baseline testing comparison will indicate whether this existing water quality within the channel meet ANZECC guidelines, prior to construction of the services building. For wet weather events where no baseline data is available a direct comparison to upstream and downstream results is undertaken. Sydney Metro's Principal Contractor will comply with Section 120 of the Protection of the Environment Operations Act 1997.

7.0 SUMMARY OF RESULTS

7.1 SUMMARY OF FIELD OBSERVATIONS

All four nominated monitoring locations were inspected (WP1, WP2, WP2-DP1 and WP2-DP2) on 30 June 2023. Three surface water sampling locations (WP1, WP2 and WP2-DP1) were able to be monitored and sampled whereas the WP2-DP2 sampling location was not able to be monitored and sampled due to the dry condition during the time of fieldwork undertaken on 30 June 2023. Photos of each nominated location are included in **Appendix B**. The following observations were made:

7.1.1 Construction-Phase Quarterly Dry-Weather Event – 30 June 2023

- The sampling event was undertaken on 30 June 2023during a dry-weather event with 0 mm precipitation over the last 24 hours prior to the field sampling (rainfall data was obtained from the closest Bureau of Meteorology weather station, i.e. Canterbury Racecourse AWS – BOM Station ID: 066194). Refer to **Appendix C** for a copy of the weather recordings obtained from the Bureau of Meteorology website (http://www.bom.gov.au/);
- Observation of water body:
  - WP 1 (upstream of work area) contained low flowing clear water with low turbidity. No visible oil sheen observed from the water surface. The estimated depth of the water body was 0.05 m.
  - WP 2 (downstream of work area) contained low flowing clear water with low turbidity. No visible oil sheen observed from the water surface. The water body was slightly deeper than WP1 and estimated to be 0.08 m.
  - WP2-DP1 (downstream eastern discharge point) contained very low flowing clear / light yellow water with low turbidity. The flow contribution from this discharge point is considered minor with estimated depth of the water body to be less than 0.005 m.
  - WP2-DP2 (downstream western discharge point) was dry. No contribution to the water body was observed during the time of sampling.
- Additional observation:
  - One discharge point (WP1-DP1) was observed immediately downstream / north of WP1. No flow contribution was observed at the time of sampling. Refer to **Appendix A** for approximate location of WP1-DP1. Refer to **Appendix B** for a detailed photo.

7.2 FIELD PARAMETERS

The parameters from each location sampled are presented in **Table 7-1**.

Table 7-1 Laboratory Physico-chemical Parameters and Field Observations – 30 June 2023

Location ID / Field Perimeter	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream eastern discharge point)
Water Depth (m)	0.05	0.08	<0.005
Estimated Flow Rate	low	low	very low

Location ID / Field Perimeter	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream eastern discharge point)
Temperature (°C)	9.8	10.9	11.0
pH	7.23	7.65	8.61
Electrical Conductivity (µS/cm)	736	1439	741
Dissolved Oxygen (mg/L)	4.83	6.14	11.13
Dissolved Oxygen (%)	42.7	57.2	101.1
Oxidation-Reduction Potential (mV)	148.0	194.4	236.3
SHE[1] Redox Potential (mV)	363.0[2]	408.8[2]	450.7[2]
Condition	Clear Low turbidity	Clear Low turbidity	Clear / Light Yellow Low turbidity

Note to Table

1 SHE – Standard Hydrogen Electrode

2 Water quality meter utilised on the day of monitoring contains Ag/AgCl reference electrode with 3.5 M KCl filling solution. As such, SHE was calculated based on Table 1 of US EPA document: SESDPROC-113-R2, Field Measurement of Oxidation-Reduction Potential (ORP).

7.3 SURFACE WATER ANALYTICAL RESULTS

Laboratory analytical results for the surface water samples collected are presented in **Appendix D**. Copies of the original laboratory reports, NATA-stamped laboratory certificates, and Chain of Custody documentation are included in **Appendix F**.

7.3.1 Construction-Phase Dry-Weather Event – 30 June 2023

The analytical results of the monitoring event indicate that:

- Concentrations of Chlorophyll-a were reported below adopted assessment criteria and laboratory LOR (<2 µg/L) at all sample locations;
- Concentrations of Oil and Grease were reported below laboratory LOR (10 mg/L) at all sample locations;
- Concentrations of nutrients (total nitrogen and the total phosphorous) were reported:
  - Total nitrogen:
    - WP1: 3.0 mg/L
    - WP2: 4.2 mg/L
    - WP2-DP1: 3.9 mg/L
  - Total phosphorous:
    - WP1: 0.27 mg/L
    - WP2: 0.40 mg/L
    - WP2-DP1: 0.46 mg/L
- TSS were reported below the laboratory LOR (<5 mg/L).
- Turbidity was reported:

- WP1: 1.9 NTU
- WP2: 1.4 NTU
- WP2-DP1: 1.1 NTU

7.3.2 Baseline Results Comparison

One sampling event during the pre-construction period (baseline event) was undertaken on 10 March 2021. This event has been used for comparison of construction-phase monitoring events under similar conditions (i.e. not triggering the wet-weather event criteria). It should be noted that the baseline water quality monitoring represents a single sampling event and may not be representative of the range of water quality within the channel prior to construction starting.

The parameters from each location sampled are presented in **Table 7-2** compared with the baseline pre-construction event undertaken on 10 March 2021. Overall, conditions are similar in the pre-construction results and the construction-phase sampling event on 30 June 2023. These baseline conditions have been taken into account in the interpretation below. It is noted that due to the scope of work assigned to Stantec by the time of baseline monitoring event, no sampling or monitoring work was undertaken at the downstream discharging points (WP2-DP1 and WP2-DP2) for comparison.

Table 7-2 Comparison of current sampling results to baseline results.

Location ID	Assessment Criteria	WP1 (upstream) Baseline Results 10 March 2021	WP1 (upstream) 30 June 2023	WP2 (downstream) Baseline Results 10 March 2021	WP2 (downstream) 30 June 2023
Temperature (oC)	N/A	21.3	9.8	21.1	10.9
pH	6.5 - 8.5	7.90	7.23	7.61	7.65
Electrical Conductivity (µS/cm)	>125 – 2,200	543	736	363	1439
Dissolved Oxygen (%)	85% - 110%	63	42.7	45.9	57.2
Oxidation-Reduction Potential (mV)	N/A	140.7	148.0	181.0	194.4
SHE[1] Redox Potential (mV)	N/A	348.13[2]	363.0[2]	388.43[2]	408.8[2]
Chlorophyll a (µg/L)	>3	<5	<2	<5	<2
Oil and Grease (mg/L)	Comparison	<10	<10	29	<10
Nitrogen (Total) (mg/L)	>0.35	2.5	3.0	1.68	4.2
Phosphorus (mg/L)	>0.025	0.34	0.27	0.12	0.4
TSS (mg/L)	N/A	<1	<5	<1	<5
Turbidity (NTU)	>6 - 50	2.9	1.9	<1	1.4

Note to Table

1 SHE – Standard Hydrogen Electrode

2 Water quality meter utilised on the day of monitoring contains Ag/AgCl reference electrode with 3.5 M KCl filling solution. As such, SHE was calculated based on Table 1 of US EPA document: SESDPROC-113-R2, Field Measurement of Oxidation-Reduction Potential (ORP).

Highlighted cell with the bold font indicates exceedance of the adopted assessment criteria.

7.4 RESULTS DISCUSSION

7.4.1 Comparison to ANZG 2018 / ANZECC 2000 Criteria

Results for the construction-phase dry-weather event sampled on 30 June 2023 generally showed monitored parameters were within the adopted threshold criteria, with the exception of dissolved oxygen, total nitrogen, total phosphorous and pH:

- Dissolved oxygen saturation measured at two monitoring locations (WP1 and WP2) were outside the adopted criteria range. This is not considered to be a significant issue based on the comparison outlined in **Section 7.3.2** indicating the dissolved oxygen saturation measured at the downstream monitoring location (WP2) during this construction-phase dry-weather event is closer to the adopted thresholds than the pre-construction baseline event.
- Total nitrogen measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criterion range with the analytical results of 3.0 mg/L, 4.2 mg/L and 3.9 mg/L for WP1, WP2, and WP2-DP1 respectively. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on the details provided in **Section 7.4.2**.
- Phosphorous measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criteria with analytical results of 0.27 mg/L, 0.4 mg/L, and 0.46 mg/L for WP1, WP2, and WP2-DP1 respectively. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on the details provided in **Section 7.4.2**.
- pH measured at WP1 and WP2 were within the adopted criterion range, whereas pH measured at WP2-DP1 (8.61) was slightly above the adopted criterion range (i.e. 6.5 – 8.5). However, it is not considered this is a significant issue based on the details provided in **Section 7.4.2**.

7.4.2 Comparison of Upstream and Downstream Results

Results between upstream and downstream samples collected during the construction-phase dry-weather event were comparable, with the exception of:

- Total nitrogen result at the downstream eastern discharge point (WP2-DP1: 3.9 mg/L) and downstream sample location (WP2: 4.2 mg/L) were slightly higher than the upstream sampling point (WP1: 3.0 mg/L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities undertaken because:
  - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that high level of total nitrogen (i.e. an order of magnitude higher than the WP2-DP1 results) was previously identified from this off-site flow contribution. Investigation of this off-site source and associated elevated nitrogen concentration was documented in the following report:
    - Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and fixing as suggested by Downer EDI.

- Total phosphorus result at the downstream eastern discharge point (WP2-DP1: 0.46 mg/L) and downstream sample location (WP2: 0.40 mg/L) were slightly higher than the upstream sampling point (WP1: 0.27 mg/L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities undertaken because:
  - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that higher level of total phosphorous was previously identified from this off-site flow contribution (0.80 mg/L). Investigation of this off-site source and associated elevated phosphorus concentration was documented in the following report:
    - Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and fixing as suggested by Downer EDI.
- The pH results at downstream eastern discharge point sample (WP2-DP1: 8.61) and downstream sample point (WP2: 7.65) were higher than the results measured at the upstream sample location (WP1: 7.23). However, it is not considered as a significant issue based on:
  - Although pH result at WP2-DP1 was measured slightly higher than the adopted criteria range, pH results of both upstream and downstream samples which were collected from the main stormwater channel (WP1 and WP2) were within the adopted criteria range.
  - As a result of mitigation measures implemented for one of the identified pH sources (i.e. Platform 1 drainage system) and progression of the construction works, the pH levels measured at WP2 and WP2-DP1 were both in a decreasing trend since August 2022. Refer to **Section 7.4.3** for details of the trend assessment undertaken for the long-term pH monitoring results.
- EC result at the downstream eastern discharge point (WP2-DP1: 741 µS/cm) and downstream sample location (WP2: 1439 µS/cm) were higher than the upstream sampling point (WP1: 736 µS/cm). However, it is not considered this is a significant issue based on:
  - EC results for all three sampling locations (WP1, WP2, WP2-DP1) measured were within the ANZG 2018 / ANZECC 2000 Criteria.
- DO result at the downstream eastern discharge point (WP2-DP1: 101.1%) and downstream sample location (WP2: 57.2%) were higher than the upstream sampling point (WP1: 42.7%). However, it is not considered this is a significant issue based on:
  - DO results at the downstream sampling locations (WP2 and WP2-DP1) were closer to or within the adopted criterion range than the upstream sampling location (WP1).

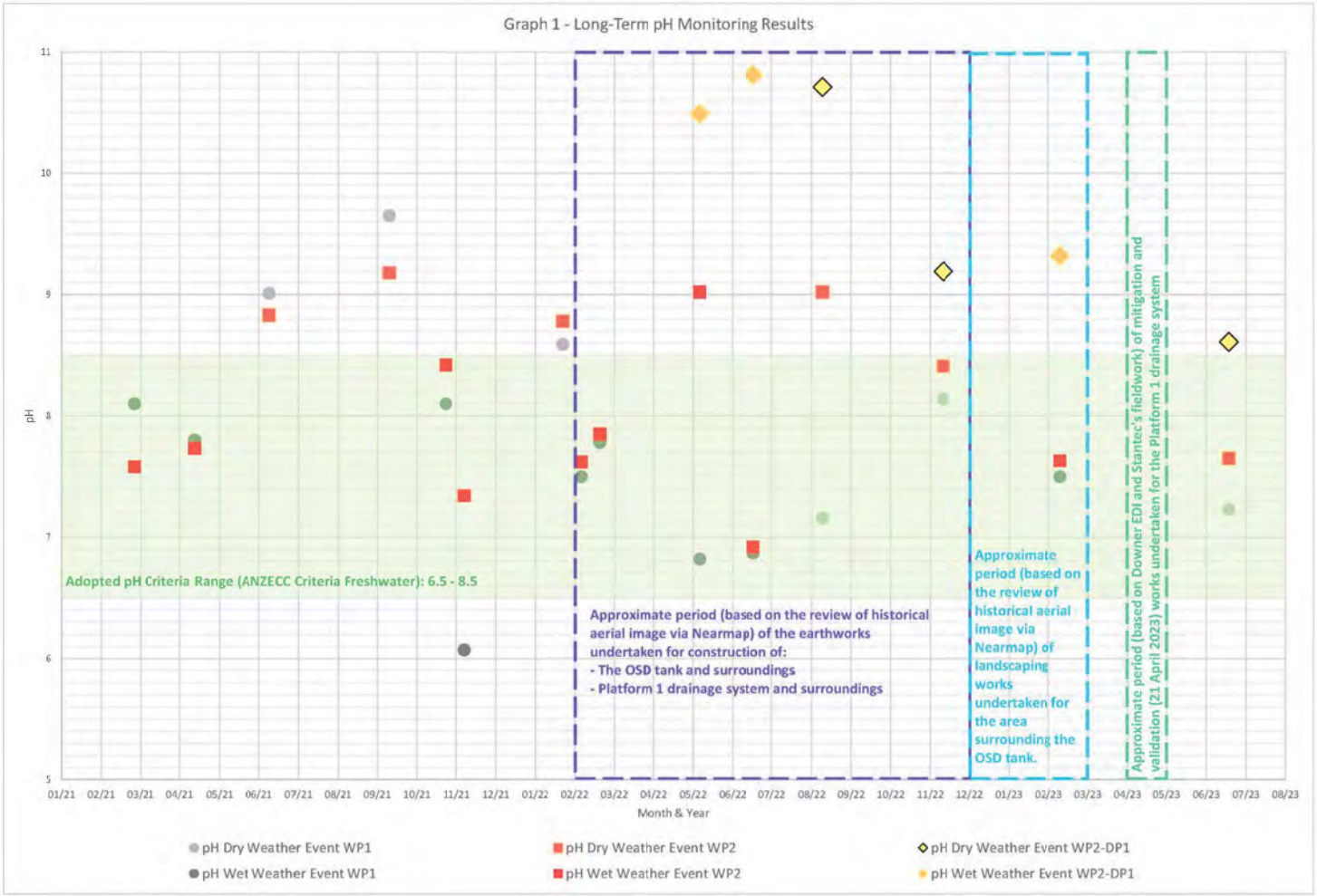
7.4.3 Trend Assessment – Long-Term pH Monitoring Results

Long-term pH monitoring results (total of 15 monitoring rounds undertaken during the period from March 2021 to June 2023) were plotted in **Graph 1** below to assist the trend assessment. Key findings indicated as following:

- During the period from February 2022 to August 2022, pH exhibited a general increasing trend at WP2 and WP2-DP1. This period overlapped with the period of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings. Based on the

results of the source investigations documented in the reports listed below, both construction activities were considered as the potential sources for the elevated pH measured at WP2-DP1.

  - Cardno now Stantec (2022b) *Surface Water Monitoring Report – Wiley Park Station*. Date: 15 September 2022. Revision: Rev0. Report reference: 304100142_R010_SWM_WileyPark_Rev0.
  - Cardno now Stantec (2022c) *Additional pH Source Investigation within the Platform 1 Drainage System at Wiley Park Station*. Date: 9 November 2022. Revision: Rev0. Report reference: 304100142_TM02_Add_pH_Inv_P1_Rev0.
- During the period from August 2022 to June 2023, pH exhibited a general decreasing trend at WP2 and WP2-DP1. This period overlapped with periods of:
  - The ending phase of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings.
  - The landscaping works undertaken for the area surrounding the OSD tank.
  - The mitigation and validation work undertaken for the Platform 1 drainage system. Details of the validation assessment undertaken by Stantec has been documented in the report listed:
    - Stantec (2023) *Validation Test of Wiley Park Station Platform 1 Drainage System 21 April 2023.* Date: 1 May 2023. Revision: RevA. Report reference: 304100142_L003_pH_P1_Val_RevA.


Graph 1 - Long-Term pH Monitoring Results
pH
Month & Year
Adopted pH Criteria Range (ANZECC Criteria Freshwater): 6.5 - 8.5
Approximate period (based on the review of historical aerial image via Nearmap) of the earthworks undertaken for construction of:
- The OSD tank and surroundings
- Platform 1 drainage system and surroundings
Approximate period (based on the review of historical aerial image via Nearmap) of landscaping works undertaken for the area surrounding the OSD tank.
Approximate period (based on Downer EDI and Stantec's fieldwork) of mitigation and validation (21 April 2023) works undertaken for the Platform 1 drainage system
pH Dry Weather Event WP1
pH Dry Weather Event WP2
pH Dry Weather Event WP2-DP1
pH Wet Weather Event WP1
pH Wet Weather Event WP2
pH Wet Weather Event WP2-DP1

8.0 CONCLUSION

Stantec was engaged to undertake surface water monitoring of the unnamed channel west of Wiley Park Station in accordance with the SWMP for the project. The objective of the works was to evaluate whether construction activities are impacting water quality downstream of the project footprint in the unnamed channel that receives in part stormwater from the construction area.

This report presents monitoring data of a construction-phase dry-weather event on 30 June 2023. Based on the investigation results obtained, following conclusions are made:

- ANZG 2018 / ANZECC 2000 comparison and assessment:
  - During this construction-phase dry-weather monitoring event, monitored parameters were either within the adopted ANZG 2018 / ANZECC 2000 screening criteria or considered insignificant for the exceedances (total nitrogen, total phosphorous, pH and dissolved oxygen saturation) based on the comparison with the pre-construction baseline monitoring results and previous investigation results.
- Upstream and downstream comparison and assessment:
  - During this construction-phase dry-weather monitoring event, the results of downstream sample point WP2, downstream discharge point (WP2-DP1) and upstream sample point WP1 were either comparable or considered insignificant / unlikely a result from the construction activities within Wiley Park worksite for the increases at downstream sample point / downstream discharge points (total nitrogen, total phosphorus, EC, pH and DO) based on the review of site plan, comparison with the pre-construction baseline monitoring results, previous investigation results and adopted ANZG 2018 / ANZECC 2000 criteria.
  - Although the downstream pH was higher than the upstream. **Graph 1** shows the downstream pH is decreasing since completion of the earthworks and landscaping. Therefore, it is anticipated the downstream pH would become similar to upstream pH levels.

9.0 REFERENCES

- ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the 'ANZECC Guidelines').
- ANZECC (2000). Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting (collectively known as the 'ANZECC Guidelines').
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines').
- Contaminated Land Management Act 1997.
- DECC (2008). Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction. (Volume 2D of the 'Blue Book').
- Environmental Planning and Assessment Act 1979 (EP&A Act).
- Landcom (2004). Managing Urban Stormwater: Soils and Construction. (Volume 1 of the 'Blue Book').
- Protection of the Environment Operations Act 1997 (POEO Act).
- Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades – Soil and Water Management Plan, dated 16th February 2021.
- The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Conditions of Approval SSI-8256, determined 12 December 2018.
- Water Management Act 2000 Water Management (General) Regulation 2018.

10.0 LIMITATIONS

This assessment has been undertaken in general accordance with the current industry standards for a surface water monitoring report for the purpose and objectives and scope identified in this report. The agreed scope of this assessment has been limited for the current purposes of the Client. The assessment may not identify contamination occurring in all areas of the site, or occurring after sampling was conducted. Subsurface conditions may vary considerably away from the sample locations where information has been obtained. This Document has been provided by Stantec subject to the following limitations:

- This Document has been prepared for the particular purpose outlined in Stantec's proposal and Section 1 of this report and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- The scope and the period of Stantec's services are as described in Stantec's proposal, and are subject to restrictions and limitations. Stantec did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Stantec in regards to it.
- Conditions may exist which were undetectable given the limited nature of the enquiry Stantec was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
- In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Stantec's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Stantec to form no more than an opinion of the actual conditions of the site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Stantec for incomplete or inaccurate data supplied by others.
- Stantec may have retained sub consultants affiliated with Stantec to provide services for the benefit of Stantec. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Stantec's affiliated companies, and their employees, officers and directors.

This assessment report is not any of the following:

- A Site Audit Report or Site Audit Statement (SAR/SAS) as defined under the Contaminated Land Management Act, 1997 or an assessment sufficient for an Environmental Auditor to be able to conclude a SAR/SAS.
- A geotechnical report and the bore logs/test pit logs may not be sufficient for geotechnical advice.
- An assessment of surface water contaminants potentially arising from other sites or sources nearby.
- A total assessment of the site to determine suitability of the entire parcel of land at the site for one or more beneficial uses of land.

Appendix A FIGURES

Surface Water Monitoring

Wiley Park Station

Project Code: 304500142
Drawn By: CZ, Checked By: CL
Figure No: 1 | Rev: 03
Date: 2023-07-20

Legend

- Monitoring Location
- Discharging Points
- Watercourse (NSW SS)
- Cadastre (NSW SS, 2022)

Notes:
1. Coordinate System: GDA2020 MGA Zone 56

References:
1. Aerial imagery supplied by MetroMap (March 2023)

Stantec

Scale at A3 1:500

m
0 5 10 15 20

Appendix B PHOTOGRAPHS

Appendix B Photographs
July 9, 2024

Photograph 1. Condition observed from sampling location of WP1 during the monitoring event – 30 June 2023.

Photograph 2. No stormwater in-flow observed from the discharge point WP1-DP1 which was located within the rail corridor and immediately downstream / north from WP1 during the monitoring event – 30 June 2023.

Photograph 3. Condition observed from sampling location of WP2 during the monitoring event – 30 June 2023.

Appendix C FIELD DOCUMENTS

Surface Water Sampling Field Record

Site / Project: Downer - Wiley Park SWM	Sampling Point: WP1, WP2, WP2-DP1(?)
Client: Downer	Job No. 30450042
Person Sampling: CZ/CC.	Initials: CZ/CC.

Site Details

Sampling Equipment – Directly into bottle / (Water Scoop) / Van Dorn Sampler / Other: Date: 30.06.2023.

Observations on Site: Last Rain Event / Recent Storms / Releases / Other : Dry Weather Event

Sample Details, Observations, GPS Coordinates & Field Physiochemical Measurements

(if possible, record parameters once stable)

Sample ID	WP1	WP2-DP1	WP2-DP2	WP2 (QA100 QA200)
Start Time:	0755	0945	dry - no flow	10:40 am
Easting	/	/		/
Northing	/	/		/
Sample Depth (m)	0-0.05	0-0.01		0-0.08
Water Body Depth (m)	0.05	0-01		0.08
Location – Onsite/Offsite /Inlet/Outlet/ Middle	Upstream	discharging point		downstream
Flow Rate None/ Low / Med / High	Very Low	very very low.		Low
DO (mg/L)	4.83	11.13		6.14
DO (%S)	42.7	101.1		57.2
EC (µS/Cm)	736	~~235.3~~ 741		1439
pH	7.23	8.61		7.65
Redox = Eh (mV)	143.0	236.3		194.4
Temp (°C)	9.8	11.0		10.9
Water Colour	Clear	clear/light yellow		Clear
Turbidity Low / Med / High	~~ve~~ low	low.		low
Observations / Notes	both streams (DP1, main) contributing	see comment on the back. flow. WP1-DP1 Not Flow.		/

Sample Container & Preservation Data

Number of sample containers:	6						
Container Volume	/						
Container Type	2x 1L Amber Glass (HP). 1x Soil Plastic (NP)						
Preservation	1x Nitric plastic, with preservation						
Filtration	2x 250ml Dissolved ise with preservation						
Sample Number (for Lab ID):	/						
QA Dup Sample No.	/				WP2		

Australian Government
Bureau of Meteorology

Latest Weather Observations for Canterbury

IDN60801

Issued at 11:32 am EST Friday 30 June 2023 (issued every 10 minutes, with the page automatically refreshed every 10 minutes)

Station Details **ID:** 066194 **Name:** CANTERBURY RACECOURSE AWS **Lat:** -33.91 **Lon:** 151.11 **Height:** 3.0 m

Data from the previous 72 hours. | See also: Recent months at Canterbury

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
30/11:30am	15.8	10.4	2.2	40	6.1	W	20	33	11	18	-	-	0.0
30/11:00am	15.4	9.6	2.2	41	5.9	W	22	39	12	21	-	-	0.0
30/10:30am	14.5	9.7	2.4	44	5.4	W	17	28	9	15	-	-	0.0
30/10:00am	13.8	8.4	2.4	46	5.0	W	20	33	11	18	-	-	0.0
30/09:30am	13.0	7.8	2.6	49	4.6	W	19	30	10	16	-	-	0.0
30/09:00am	12.4	7.5	2.3	50	4.4	W	17	32	9	17	-	-	0.0
30/08:30am	11.3	7.2	2.1	53	3.9	W	13	20	7	11	-	-	0.0
30/08:00am	10.1	4.7	1.5	55	3.6	W	19	28	10	15	-	-	0.0
30/07:30am	8.7	4.4	1.1	59	3.1	W	13	28	7	15	-	-	0.0
30/07:00am	8.2	4.6	0.7	59	3.0	NW	9	17	5	9	-	-	0.0
30/06:30am	8.7	4.4	0.7	57	3.2	W	13	20	7	11	-	-	0.0
30/06:00am	8.8	4.4	0.5	56	3.3	WNW	13	22	7	12	-	-	0.0
30/05:30am	8.9	4.5	0.6	56	3.3	WNW	13	22	7	12	-	-	0.0
30/05:00am	9.1	4.7	0.6	55	3.4	W	13	28	7	15	-	-	0.0
30/04:30am	7.6	4.0	0.3	60	2.9	NW	9	15	5	8	-	-	0.0
30/04:00am	8.2	4.2	0.4	58	3.1	NW	11	15	6	8	-	-	0.0
30/03:30am	8.1	3.3	0.1	57	3.2	W	15	22	8	12	-	-	0.0
30/03:00am	7.5	3.4	0.0	59	2.9	WNW	11	20	6	11	-	-	0.0
30/02:30am	7.8	3.4	0.1	58	3.0	NW	13	17	7	9	-	-	0.0
30/02:00am	8.2	3.3	-0.3	55	3.3	NW	15	26	8	14	-	-	0.0
30/01:30am	8.1	3.3	-0.1	56	3.2	NW	15	20	8	11	-	-	0.0
30/01:00am	8.5	3.6	-0.5	53	3.5	WNW	15	24	8	13	-	-	0.0
30/12:30am	8.4	4.6	-0.4	54	3.4	WNW	9	15	5	8	-	-	0.0
30/12:00am	7.8	4.0	-0.4	56	3.2	W	9	15	5	8	-	-	0.0

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
29/11:30pm	6.7	3.6	-0.1	62	2.6	WNW	6	15	3	8	-	-	0.0
29/11:00pm	6.4	3.5	-0.8	60	2.7	NW	4	9	2	5	-	-	0.0
29/10:30pm	7.7	4.3	-0.5	56	3.2	WNW	7	11	4	6	-	-	0.0

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
29/10:00pm	7.5	3.7	-0.5	57	3.1	W	9	15	5	8	-	-	0.0
29/09:30pm	7.7	4.0	0.0	58	3.0	WNW	9	20	5	11	-	-	0.0
29/09:00pm	6.6	3.3	0.3	64	2.5	NW	7	11	4	6	-	-	0.0
29/08:30pm	7.2	4.4	-0.3	59	2.9	NW	4	7	2	4	-	-	0.0
29/08:00pm	8.8	5.5	-0.2	53	3.5	WNW	7	13	4	7	-	-	0.0
29/07:30pm	9.5	5.8	-0.1	51	3.8	WNW	9	13	5	7	-	-	0.0
29/07:00pm	10.4	6.0	0.2	49	4.1	WSW	13	26	7	14	-	-	0.0
29/06:30pm	10.4	6.7	0.2	49	4.1	WSW	9	15	5	8	-	-	0.0
29/06:00pm	11.1	7.1	0.2	47	4.4	WSW	11	17	6	9	-	-	0.0
29/05:30pm	11.5	7.4	0.0	45	4.7	SW	11	20	6	11	-	-	0.0
29/05:00pm	12.5	8.0	0.0	42	5.1	WSW	13	20	7	11	-	-	0.0
29/04:30pm	13.4	8.8	-1.0	37	5.9	SW	13	26	7	14	-	-	0.0
29/04:00pm	14.1	9.2	-0.7	36	6.1	SW	15	24	8	13	-	-	0.0
29/03:30pm	14.8	9.6	-0.1	36	6.3	SW	17	24	9	13	-	-	0.0
29/03:00pm	15.0	10.6	0.1	36	6.3	SW	13	20	7	11	-	-	0.0
29/02:30pm	14.8	9.6	-0.1	36	6.3	SW	17	26	9	14	-	-	0.0
29/02:00pm	14.8	10.4	0.3	37	6.1	SW	13	20	7	11	-	-	0.0
29/01:30pm	14.8	9.6	0.3	37	6.1	WSW	17	26	9	14	-	-	0.0
29/01:00pm	14.9	10.7	1.4	40	5.9	SW	13	20	7	11	-	-	0.0
29/12:30pm	14.4	10.1	1.0	40	5.7	SW	13	20	7	11	-	-	0.0
29/12:00pm	13.8	9.1	1.1	42	5.4	WSW	15	22	8	12	-	-	0.0
29/11:30am	13.6	8.0	0.9	42	5.4	SW	20	32	11	17	-	-	0.0
29/11:00am	13.4	8.8	3.5	51	4.4	WSW	17	32	9	17	-	-	0.0
29/10:30am	12.9	8.2	3.3	52	4.3	WSW	17	26	9	14	-	-	0.0
29/10:00am	12.2	8.4	3.7	56	3.8	WSW	13	22	7	12	-	-	0.0
29/09:30am	11.8	8.5	4.3	60	3.4	W	11	17	6	9	-	-	0.0
29/09:00am	10.7	7.8	4.4	65	2.8	WSW	9	17	5	9	-	-	3.0
29/08:30am	9.7	7.3	5.1	73	2.1	WNW	7	11	4	6	-	-	3.0
29/08:00am	8.0	5.6	5.1	82	1.3	WSW	7	9	4	5	-	-	3.0
29/07:30am	5.4	3.0	4.1	91	0.5	W	6	7	3	4	-	-	3.0
29/07:00am	5.7	3.0	3.9	88	0.8	WNW	7	9	4	5	-	-	3.0
29/06:30am	6.4	3.8	4.1	85	1.0	WSW	7	9	4	5	-	-	3.0
29/06:00am	7.0	4.4	4.0	81	1.3	SW	7	9	4	5	-	-	3.0
29/05:30am	7.9	3.8	4.3	78	1.6	SW	15	22	8	12	-	-	3.0
29/05:00am	6.3	4.1	5.3	93	0.4	WSW	6	9	3	5	-	-	3.0
29/04:30am	5.8	3.6	5.2	96	0.3	WNW	6	7	3	4	-	-	3.0
29/04:00am	5.6	3.6	4.4	92	0.5	NNW	4	7	2	4	-	-	3.0
29/03:30am	6.6	5.0	4.4	86	0.9	NNW	2	7	1	4	-	-	3.0
29/03:00am	7.7	5.5	5.2	84	1.1	NW	6	7	3	4	-	-	3.0
29/02:30am	8.1	5.6	5.0	81	1.4	NW	7	11	4	6	-	-	3.0
29/02:00am	8.7	6.0	5.4	80	1.5	WSW	9	15	5	8	-	-	3.0
29/01:30am	9.5	5.6	5.5	76	1.8	SW	15	24	8	13	-	-	3.0
29/01:00am	9.7	6.4	6.4	80	1.5	SW	13	22	7	12	-	-	3.0
29/12:30am	9.2	7.1	6.8	85	1.1	W	7	13	4	7	-	-	3.0
29/12:00am	9.5	8.1	7.4	87	1.0	NW	4	7	2	4	-	-	3.0

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
28/11:30pm	9.5	7.8	7.4	87	1.0	WNW	6	7	3	4	-	-	3.0
28/11:00pm	9.7	7.9	7.3	85	1.1	WNW	6	9	3	5	-	-	3.0
28/10:30pm	9.9	7.9	7.3	84	1.2	WNW	7	9	4	5	-	-	3.0
28/10:00pm	10.0	7.7	7.6	85	1.1	W	9	11	5	6	-	-	3.0
28/09:30pm	10.1	8.3	7.9	86	1.1	WNW	7	11	4	6	-	-	3.0
28/09:00pm	10.0	8.3	8.4	90	0.8	WSW	7	11	4	6	-	-	3.0
28/08:30pm	10.0	8.6	9.4	96	0.3	WNW	7	13	4	7	-	-	3.0
28/08:00pm	9.8	8.5	9.2	96	0.3	WNW	6	9	3	5	-	-	3.0
28/07:30pm	10.4	8.6	9.5	94	0.4	SW	9	15	5	8	-	-	3.0
28/07:00pm	10.4	8.8	10.2	99	0.1	W	9	13	5	7	-	-	3.0
28/06:30pm	10.2	8.9	10.1	99	0.1	W	7	11	4	6	-	-	3.0
28/06:00pm	10.3	9.0	10.1	99	0.1	WNW	7	11	4	6	-	-	3.0
28/05:30pm	10.3	9.0	10.0	98	0.2	W	7	11	4	6	-	-	2.8
28/05:00pm	10.4	9.1	9.8	96	0.3	W	7	11	4	6	-	-	2.8
28/04:30pm	10.5	9.1	9.7	95	0.4	W	7	11	4	6	-	-	2.6
28/04:00pm	10.6	8.9	9.7	94	0.5	W	9	11	5	6	-	-	2.6
28/03:30pm	10.6	9.4	9.7	94	0.5	WNW	6	9	3	5	-	-	2.6
28/03:00pm	10.6	9.4	9.7	94	0.5	WNW	6	9	3	5	-	-	2.6
28/02:30pm	10.4	9.1	9.8	96	0.3	NNW	7	13	4	7	-	-	2.6
28/02:00pm	10.0	7.8	9.5	97	0.2	NW	11	17	6	9	-	-	2.6
28/01:30pm	10.0	7.4	9.4	96	0.3	WNW	13	20	7	11	-	-	2.6
28/01:20pm	10.1	7.9	9.5	96	0.3	WNW	11	19	6	10	-	-	2.4
28/01:00pm	10.4	7.9	9.6	95	0.4	NW	13	19	7	10	-	-	2.0
28/12:30pm	11.0	8.5	9.8	92	0.6	W	13	19	7	10	-	-	1.4
28/12:00pm	11.3	8.8	9.6	89	0.9	WNW	13	20	7	11	-	-	1.2
28/11:30am	11.3	9.5	9.6	89	0.9	W	9	19	5	10	-	-	1.0
28/11:00am	11.5	9.8	9.8	89	0.9	W	9	15	5	8	-	-	0.8
28/10:30am	11.1	9.9	9.5	90	0.8	W	6	11	3	6	-	-	0.6
28/10:00am	10.7	8.9	9.3	91	0.7	WNW	9	15	5	8	-	-	0.6
28/09:30am	10.6	8.4	9.2	91	0.7	WNW	11	24	6	13	-	-	0.4
28/09:00am	10.7	8.9	9.3	91	0.7	NW	9	13	5	7	-	-	1.0
28/08:30am	10.6	8.7	9.0	90	0.8	WNW	9	15	5	8	-	-	0.8
28/08:00am	10.0	9.0	8.9	93	0.5	WNW	4	9	2	5	-	-	0.4
28/07:30am	9.8	9.4	8.4	91	0.7	CALM	0	0	0	0	-	-	0.4
28/07:00am	9.9	9.0	7.8	87	1.0	NW	2	7	1	4	-	-	0.0
28/06:30am	10.0	9.3	7.1	82	1.4	CALM	0	0	0	0	-	-	0.0
28/06:00am	10.0	9.2	6.3	78	1.7	CALM	0	0	0	0	-	-	0.0
28/05:30am	10.3	9.5	6.3	76	1.9	CALM	0	0	0	0	-	-	0.0
28/05:00am	10.8	9.5	5.8	71	2.3	NW	2	7	1	4	-	-	0.0
28/04:30am	11.2	10.2	5.5	68	2.6	CALM	0	0	0	0	-	-	0.0
28/04:00am	11.6	9.3	5.0	64	3.0	NW	6	9	3	5	-	-	0.0
28/03:30am	11.7	9.2	4.7	62	3.2	NW	7	11	4	6	-	-	0.0
28/03:00am	10.3	9.3	5.7	73	2.1	CALM	0	0	0	0	-	-	0.0
28/02:30am	11.5	9.2	4.7	63	3.1	NW	6	9	3	5	-	-	0.0
28/02:00am	11.3	9.0	5.0	65	2.9	NW	6	13	3	7	-	-	0.0
28/01:30am	11.5	9.2	4.9	64	3.0	WNW	6	7	3	4	-	-	0.0
28/01:00am	11.9	9.5	4.4	60	3.4	WNW	6	9	3	5	-	-	0.0

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
28/12:30am	11.8	9.2	4.3	60	3.4	W	7	11	4	6	-	-	0.0
28/12:00am	12.3	9.7	4.0	57	3.7	NW	7	11	4	6	-	-	0.0

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
27/11:30pm	12.3	9.7	4.3	58	3.6	NW	7	11	4	6	-	-	0.0
27/11:00pm	12.6	10.0	4.3	57	3.8	W	7	11	4	6	-	-	0.0
27/10:30pm	12.3	9.8	4.5	59	3.5	WNW	7	11	4	6	-	-	0.0
27/10:00pm	11.0	8.9	6.0	71	2.3	WSW	6	9	3	5	-	-	0.0
27/09:30pm	10.2	9.4	6.7	79	1.6	CALM	0	0	0	0	-	-	0.0
27/09:00pm	10.7	9.1	6.5	75	2.0	WSW	4	7	2	4	-	-	0.0
27/08:30pm	10.3	9.6	6.8	79	1.6	CALM	0	0	0	0	-	-	0.0
27/08:00pm	10.7	9.9	6.5	75	2.0	CALM	0	0	0	0	-	-	0.0
27/07:30pm	11.2	10.2	5.7	69	2.5	CALM	0	0	0	0	-	-	0.0
27/07:00pm	10.1	8.0	5.9	75	1.9	NW	6	9	3	5	-	-	0.0
27/06:30pm	10.6	9.5	5.2	69	2.5	CALM	0	0	0	0	-	-	0.0
27/06:00pm	11.9	10.8	5.1	63	3.1	CALM	0	0	0	0	-	-	0.0
27/05:30pm	12.9	10.4	3.8	54	4.1	WSW	6	7	3	4	-	-	0.0
27/05:00pm	13.8	11.6	3.6	50	4.6	WSW	4	9	2	5	-	-	0.0
27/04:30pm	15.5	12.9	3.3	44	5.5	SW	6	13	3	7	-	-	0.0
27/04:00pm	16.6	12.6	3.0	40	6.2	SW	13	19	7	10	-	-	0.0
27/03:30pm	17.7	13.4	3.2	38	6.7	WSW	15	22	8	12	-	-	0.0
27/03:00pm	17.7	13.5	3.6	39	6.6	SW	15	24	8	13	-	-	0.0
27/02:30pm	17.6	13.3	3.1	38	6.7	WSW	15	22	8	12	-	-	0.0
27/02:00pm	17.8	13.6	3.7	39	6.6	SW	15	24	8	13	-	-	0.0
27/01:30pm	17.8	13.7	2.5	36	7.0	WSW	13	20	7	11	-	-	0.0
27/01:00pm	17.6	13.3	3.1	38	6.7	W	15	24	8	13	-	-	0.0
27/12:30pm	17.7	13.4	3.2	38	6.7	WSW	15	20	8	11	-	-	0.0
27/12:00pm	17.1	13.6	3.4	40	6.3	W	11	20	6	11	-	-	0.0

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Appendix D LABORATORY SUMMARY TABLES

Stantec

Results Table - 30 June 2023

Project Number: 304500142
Site Identification: Wiley Park Station
Report Title: Surface Water Monitoring

				TPH	Inorganics				Field Physio-Chemical			
			Chlorophyll a	Oil and Grease	Nitrogen (Total as N)	Phosphorus (Total as P)	TSS	Turbidity	pH - Field	Temprature	Electrical Conductivity	Dissolved Oxygen
			µg/L	mg/L	µg/L	µg/L	mg/L	NTU	Units	°C	uS/cm	%Sat
EQL			2	10	100	10	5	1	0.01	0.1	0.1	0.1
ANZECC Criteria - Freshwater			**3**	**-**	**350**	**25**	**-**	**<6-50**	**6.5-8.5**	**-**	**125-2200**	**85-110**
Lab Report Number	**Field ID**	**Date**										
1003789	**WP1**	**30/06/2023**	<2	<10	**3000**	**270**	<5	1.9	7.23	9.8	736	**42.7**
1003789	**WP2**	**30/06/2023**	<2	<10	**4200**	**400**	<5	1.4	7.65	10.9	1439	**57.2**
1003789	**WP2 - DP1**	**30/06/2023**	<2	<10	**3900**	**460**	<5	1.1	**8.61**	11.0	741	101.1
1003789	**QA100**	**30/06/2023**	NT	<10	**4200**	**430**	<5	5.6	NT	NT	NT	NT
ES2321814	**QA200**	**30/06/2023**	NT	<5	**4000**	**350**	<5	3.2	NT	NT	NT	NT
Maximum Concentration			<2	<10	**4200**	**460**	<5	5.6	**8.61**	11.0	1439	101.1

Appendix E QUALITY ASSURANCE/QUALITY CONTRAL

Appendix E Quality Assurance/Quality Contral
July 9, 2024

Quality Assurance/Quality Control (QA/QC) procedures were implemented to ensure the precision accuracy, representativeness, completeness and comparability of all data gathered. The QA/QC procedures included:

- Equipment calibration to ensure field measurements obtained are accurate
- Equipment decontamination to prevent cross contamination
- Use of appropriate measures (i.e. gloves) to prevent cross contamination
- Appropriate sample identification
- Correct sample preservation
- Sample transport with Chain of Custody (COC) documentation
- Laboratory analysis in accordance with NATA accredited methods.

Table E1 details the QA/QC procedures and sample collection details undertaken through the surface water elements of the investigation. Copies of all the COCs, along with the Sample Receipt Notifications (SRNs), Interpretive QA/QC Reports are provided in **Appendix F**.

Table E1 Field QA/QC Method Validation

Requirement	Yes / No	Comments
Equipment decontamination	Yes	In the event of involving reusable equipment. Decontamination of sampling equipment (water quality meter, telescopic water scoop etc.) was undertaken by washing with phosphate free detergent (Liquinox) followed by a rinse with potable water.
Sample collection	Yes	Samples were collected using disposable nitrile gloves via telescopic water scoop. A clean pair of gloves was used for each new sample being collected to limit the possibility of cross-contamination.
QA/QC sample collection	Yes	One (1) surface water duplicate and one (1) surface water triplicate sample were collected for intra and inter-lab QA/QC purposes to monitor the quality of the field practices for sample collection. Stantec based the investigation around a rate of one duplicate and triplicate sample per sampling event, as the requirement for duplicate and triplicate sample collection.
Sample identification	Yes	All samples were marked with a unique identifier including project number, sample location, and date.
Sample preservation	Yes	Samples were placed in a chilled ice box with ice for storage and transport to the laboratory.
COC documentation	Yes	A COC form was completed by Stantec detailing sample identification, collection date, sampler and laboratory analysis required. The COC form was signed off and returned to Stantec by the laboratory staff upon receipt of all the samples. COC forms and Sample Receipt Notification (SRN) are provided in Appendix F. The SRN indicates that the samples were received at the laboratory intact and chilled and within the required holding times.
NATA accredited methods	Yes	The NATA accredited Eurofins mgt and ALS Analysed the samples in accordance with NATA accredited methods. Analytical methods used are indicated in the stamped laboratory results provided in Appendix F.
Laboratory Internal QC	Yes	All Data Quality Objectives were met by the laboratories.

Table E2 Field QA/QC Collection Summary

Environmental Media	Date	Primary	Duplicate	Triplicate
Surface Water	30/06/2023	WP2	QA100	QA200

Relative Percentage Difference Determination

Laboratory results for duplicate and triplicate samples are assessed using a determination of the Relative Percentage Difference (RPD). Where a primary sample and a duplicate sample are compared, the RPD provides an indication of the reproducibility of the results, which incorporates the sampling method. Where a primary sample and a split sample are compared, the RPD provides an indication of the accuracy of the primary laboratory results as compared to the secondary laboratory result.

The calculation used to determine the RPD is:

$$RPD = \frac{(Co - Cs)}{\left(\frac{Co + Cs}{2}\right)} x100$$

Where:

Co = Concentration of the original sample

Cs = Concentration of the duplicate sample

In calculating the RPD values the following protocols were adopted:

- Where both concentrations are above laboratory reporting limits the RPD formula is used;
- Where both concentrations are below the laboratory reporting limits, no RPD is calculated; and
- Where one or both sample concentrations are reported to be less than ten times (<10x) the laboratory reporting limit, the RPD is calculated but is not assessed against the adopted criterion.

In accordance with the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended 2013, Stantec adopts an RPD acceptance criterion up to 30% of the mean concentration of the analyte. It should be noted that variations might be higher for organic analysis, due to the volatile nature of the components, and for low concentrations of analytes.

The adopted criterion will not apply to RPDs where one of both concentrations are less than 10 times the reporting limit, as this criterion would otherwise overestimate the significance of minor variations in concentrations at or near the laboratory reporting limit. Large RPDs returned for low concentrations of analytes near the reporting limit is not as indicative of a significant difference in the results as a small RPD is for larger concentrations.

This approach is employed by NATA-accredited laboratories when assessing internal duplicate sample RPDs. This approach acknowledges that concentrations at or around the reporting limit are too low for an accurate evaluation of the significance of the RPD.

This approach has been adopted when assessing the relevance (compliance) of RPDs during this investigation. RPDs will be calculated for sample sets where one or both concentrations are less than 10 times the reporting limit for discussion purposes, but will not be assessed as a pass or fail in relation to the criterion.

The RPD results for duplicate samples are presented in this appendix. Although two (2) RPD values (turbidity) were reported to be above the accepted 30% RPD criteria (refer to the RPD table attached

below), the breaches in RPDs are not considered to alter the overall outcome of the assessment. It can be concluded that the analytical data can be relied upon for the purposes of this factual report.

Laboratory QC and QCI Report Summary

The laboratories selected for undertaking the analysis (Eurofins mgt and ALS) are NATA-accredited for the analysis required, and undertook certain QA/QC requirements to demonstrate the suitability of the data that is obtained. The laboratory is required to undertake and report internal laboratory Quality Control (QC) procedures for all chemical analysis undertaken. The QC testing is required to include:

- Laboratory duplicate sample analysis at the rate of one duplicate analysis per ten samples
- Method blank at the rate of one method blank analysis per 20 samples
- Laboratory control sample at the rate of one laboratory control sample analysis per 20 samples
- Spike recovery analysis at the rate of one spike recovery analysis per 20 samples.

Compliance with the laboratory QA/QC requirements and non-conformance details are discussed in the internal Laboratory QA/QC reports included with the certificates of analysis in **Appendix F**. Laboratory QA/QC requirements were within acceptance limits.

Stantec concludes that the data reported by the NATA-accredited Eurofins mgt and ALS as presented in this report is suitable for interpretative purposes and to make conclusions/recommendations regarding water quality.

		Field ID	WP2	QA100		WP2	QA200	
		Matrix Type	Water	Water		Water	Water	
		Date	30 Jun 2023	30 Jun 2023		30 Jun 2023	30 Jun 2023	
		Lab Report Number	1003789	1003789	RPD	1003789	ES2321814	RPD
	Unit	EQL						
NA								
Phosphate total (as P)	MG/L	0.01	0.4	0.43	7	0.4	0.35	13
Chlorophyll a	µg/L	2	<2	NT	NC	<2	NT	NC
TPH								
Oil and Grease	mg/L	5	<10	<10	0	<10	<5	0
Inorganics								
Kjeldahl Nitrogen Total	µg/L	100	NT	NT	NC	NT	3,400	NC
Nitrate & Nitrite (as N)	µg/L	10	NT	NT	NC	NT	560	NC
Nitrogen (Total)	µg/L	100	4,200	4,200	0	4,200	4,000	5
TSS	µg/L	5,000	<5,000	<5,000	0	<5,000	<5,000	NC
Turbidity	NTU	0.1	1.4	5.6	120	1.4	3.2	78

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: (1 - 10 x EQL); 30 (10 - 30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

WAMSCIENTIFIC
Your water and air monitoring equipment specialists

Certificate of Service and Calibration
Water Quality Meter
YSI Professional Plus

Company Name	WAM Scientific
Office Address	26 Bungarra Crescent, Chipping Norton NSW 2170
Phone Number	+61 405 241 484
Contact Name	William Pak
Instrument	YSI ProQuatro Water Quality Meter w/ 1m Quatro Cable
Serial Number	22H104712
Client Name	Chong Zeng (Stantec Australia)
Project Number	304500142
Comments	-

Instrument Check

Item	Test	Test Passed	Comments
2 x Alkaline C-size Batteries	Klein Tools MM300 Multimeter	✓	Both batteries reading above 2.9V
Battery Saver Function	Operation	✓	Automatically turns off after 60 minutes if idle
Unit Display	Operation	✓	Screen visible, no damage
Keypad	Operation	✓	Responsive, no damage
Connection Port and Cable	Condition/Check	✓	Clean, no damage
Monitor Housing	Condition/Check	✓	No damage
Firmware	Version	✓	4.0.0
pH Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
pH millivolts for pH 7.00	Calibration	✓	pH 7.00 calibration range between 0 mV ± 50 mV
pH millivolts for pH 4.00	Calibration	✓	pH 4 mV range +165 to +180 from 7 buffer mV value
pH slope	Calibration	✓	Range between 55 to 60 mV/pH (ideal value 59 mV)
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
ORP Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
ORP Reading	Calibration	✓	Within ± 80 mV of reference Zobell Reading
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
Conductivity/Temp Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
Conductivity Cell	Calibration	✓	Conductivity cell constant 5.0 ± 1.0 in GLP file
Clean Sensor Readings	Calibration	✓	Clean sensor reads less than 3 uS/cm in dry air
Dissolved Oxygen Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
DO Cap	Condition/Calibration	✓	1.25 mil PE membrane (yellow membrane)
DO Sensor in Use	Condition	✓	Polarographic DO sensor
DO Sensor Value	Calibration	✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA

Instrument Readings

Parameter	Standard Used	Reference No.	Calibration Value	Observed	Actual	Units
Temperature	Centre 370 Thermometer	Room Temp.	13.0	13.0	13.0	°C
pH	pH 4.00	386466	4.01	3.95	4.01	pH
pH	pH 7.00	387329	7.00	6.95	7.00	pH
Conductivity	2760 µs/cm at 25°C	388521	2760	2936	2760	µs/cm
ORP (Ref. check only)	Zobell A & B	380835/382785	255.0	245.0	255.0	mV
Zero Dissolved O_2	$NaSO_3$ in Distilled H_2O	389912	0.0	-0.5	0.0	%
100% Dissolved O_2	100% Air Saturated H_2O	Fresh Air	100.0	100.0	100.0	%

Declaration

WAM Scientific certifies that the above instrument was successfully tested according to manufacturer's standards and all necessary checks were conducted to ensure the instrument was fully operational prior to dispatch. The calibration data supplied was obtained in accordance with manufacturer's specifications using solutions of known values.

Calibrated By	William Pak
Calibration Date	28/06/2023
Calibration Due	28/12/2023

WAM Scientific:
26 Bungarra Crescent
CHIPPING NORTON NSW 2170
T: +61 405 241 484 | +61 424 198 667
E: rentals@wamscientific.com.au
E: accounts@wamscientific.com.au

Appendix F LABORATORY REPORTS

Stantec

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Contact Person:	Claire Corbett	Project Name:	Downer Sydney Metro Stations - Wiley Park
Telephone Number:	0439 088 345	Project Number:	304500142
Alternative Contact:	Chong Zheng	PO No.:	
Telephone Number:	0451 780 991	Project Specific Quote No. :	190408CDNN_1
Sampler:	CZ / CC	Turnaround Requirements:	5 Days TAT
Email Address (results and invoice):	claire.corbett@cardno.com.au; chong.zeng@cardno.com.au; ContamNSW@cardno.com.au	Lab:	Eurofins |
Address: Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia		Attn:	Sample Receipt

Sample Information						Analysis Required												Comments
Cardno Sample ID	Laboratory Sample ID	No. Containers	Preservation	Date sampled	Matrix	Chlorophyll-a (LOR Required - 2 ug/L)	TSS	Turbidity	Oil and Grease	Total Phosphorus	Total Nitrogen							
WP1		6	ICE	30/06/2023	Water	1	1	1	1	1	1							Please reduce the detection limit of Chlorophyll a from 5 ug/L to 2 ug/L
WP2		6	ICE		Water	1	1	1	1	1	1							
WP2-DP1		6	ICE		Water	1	1	1	1	1	1							
QA100		4	ICE		Water		1	1	1	1	1							

Relinquished by:	Chong Zeng	Received by:	email Received	Relinquished by:		Received by:		Relinquished by:	
(name / company)	Stantec	(name / company)		(name / company		(name / company)		(name / company)	
Date & Time:	6/30/2023	Date & Time:	30/6 12:35	Date & Time:		Date & Time:		Date & Time:	
Signature:	CZ	Signature:		Signature:		Signature:		Signature:	
Received by:		Relinquished by:		Received by:		Relinquished by:		Lab use:	
(name / company)		(name / company)		(name / company		(name / company)		Samples Received: Cool or Ambient (circle one)	
Date & Time:		Date & Time:		Date & Time:		Date & Time:		Temperature Received at:	(if applicable)
Signature:		Signature:		Signature:		Signature:		Transported by: Hand delivered / courier	

www.eurofins.com.au EnviroSales@eurofins.com

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ABN: 50 005 085 521

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NATA# 1261 Site# 1254

Geelong
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NATA# 1261 Site# 25403

Sydney
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NATA# 1261 Site# 18217

Canberra
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Tel: +61 2 6113 8091
NATA# 1261 Site# 25466

Brisbane
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Tel: +61 7 3902 4600
NATA# 1261 Site# 20794

Newcastle
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Mayfield West NSW 2304
Tel: +61 2 4968 8448
NATA# 1261
Site# 25079 & 25289

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NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
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IANZ# 1327

Christchurch
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Rolleston,
Christchurch 7675
Tel: +64 3 343 5201
IANZ# 1290

Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (NSW/ACT)
Contact name:	Claire Corbett
Project name:	DOWNER SYDNEY METRO STATIONS -WILEY PARK
Project ID:	304500142
Turnaround time:	5 Day
Date/Time received	Jun 30, 2023 12:35 PM
Eurofins reference	1003789

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Hannah Mawbey on phone : or by email: HannahMawbey@eurofins.com

Results will be delivered electronically via email to Claire Corbett - claire.corbett@cardno.com.au.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (NSW/ACT) email address.

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web: www.eurofins.com.au
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Christchurch 7675
Tel: +64 3 343 5201
IANZ# 1290

Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Project Name: DOWNER SYDNEY METRO STATIONS -WILEY PARK
Project ID: 304500142

Order No.:
Report #: 1003789
Phone:
Fax:

Received: Jun 30, 2023 12:35 PM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: Claire Corbett

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Chlorophyll a	Oil & Grease (HEM)	Phosphate total (as P)	Total Nitrogen (as N)	Total Suspended Solids Dried at 103 °C to 105 °C	Total Suspended Solids Dried at 103 °C to 105 °C	Turbidity	Turbidity
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X		X	
Sydney Laboratory - NATA # 1261 Site # 18217											X		X
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	WP1	Jun 30, 2023		Water	S23-Jn0070958	X	X	X	X	X		X	
2	WP2	Jun 30, 2023		Water	S23-Jn0070959	X	X	X	X	X		X	
3	WP2 - DP1	Jun 30, 2023		Water	S23-Jn0070960	X	X	X	X	X		X	
4	QA100	Jun 30, 2023		Water	S23-Jn0070961		X	X	X		X		X
Test Counts						6	4	4	4	4	4	4	4

Stantec Australia Pty Ltd
Level 22, 570 Bourke Street
Melbourne
VIC 3000

Attention: **Claire Corbett**

Report **1003789-W**
Project name DOWNER SYDNEY METRO STATIONS -WILEY PARK
Project ID 304500142
Received Date Jun 30, 2023

Client Sample ID			**WP1**	**WP2**	**WP2 - DP1**	**QA100**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S23-Jn0070958**	**S23-Jn0070959**	**S23-Jn0070960**	**S23-Jn0070961**
Date Sampled			**Jun 30, 2023**	**Jun 30, 2023**	**Jun 30, 2023**	**Jun 30, 2023**
Test/Reference	LOR	Unit				
Chlorophyll a	2	ug/L	< 2	< 2	< 2	-
Oil & Grease (HEM)	10	mg/L	< 10	< 10	< 10	< 10
Phosphate total (as P)	0.01	mg/L	0.27	0.40	0.46	0.43
Total Nitrogen (as N)	0.2	mg/L	3.0	4.2	3.9	4.2
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	< 5	< 5	< 5	< 5
Turbidity	1	NTU	1.9	1.4	1.1	5.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chlorophyll a	Melbourne	Jul 14, 2023	28 Days
- Method: LTM-INO-4340 Chlorophyll a in Waters			
Oil & Grease (HEM)	Melbourne	Jul 03, 2023	28 Days
- Method: LTM-INO-4380 Oil and Grease (APHA 5520B)			
Phosphate total (as P)	Melbourne	Jul 03, 2023	28 Days
- Method: LTM-INO-4040 Phosphate by CFA			
Total Nitrogen (as N)	Melbourne	Jul 03, 2023	7 Days
- Method: LTM-INO-4040 Phosphate and Nitrogen in waters			
Total Suspended Solids Dried at 103 °C to 105 °C	Sydney	Jul 03, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Turbidity	Melbourne	Jul 04, 2023	28 Days
- Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)			
- Method: LTM-INO-4140 Turbidity by Nephelometric Method			

Repeat Samples

Description	Testing Site	Extracted	Holding Time
Chlorophyll a	Melbourne	Jul 14, 2023	28 Days
- Method: LTM-INO-4340 Chlorophyll a in Waters			
Oil & Grease (HEM)	Melbourne	Jul 03, 2023	28 Days
- Method: LTM-INO-4380 Oil and Grease (APHA 5520B)			
Phosphate total (as P)	Melbourne	Jul 03, 2023	28 Days
- Method: LTM-INO-4040 Phosphate by CFA			
Total Nitrogen (as N)	Melbourne	Jul 03, 2023	7 Days
- Method: LTM-INO-4040 Phosphate and Nitrogen in waters			
Total Suspended Solids Dried at 103 °C to 105 °C	Sydney	Jul 03, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Turbidity	Melbourne	Jul 04, 2023	28 Days
- Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)			
- Method: LTM-INO-4140 Turbidity by Nephelometric Method			

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Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Project Name: DOWNER SYDNEY METRO STATIONS -WILEY PARK
Project ID: 304500142

Order No.:
Report #: 1003789
Phone:
Fax:

Received: Jun 30, 2023 12:35 PM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: Claire Corbett

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Chlorophyll a	Oil & Grease (HEM)	Phosphate total (as P)	Total Nitrogen (as N)	Total Suspended Solids Dried at 103 °C to 105 °C	Total Suspended Solids Dried at 103 °C to 105 °C	Turbidity	Turbidity
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X		X	
Sydney Laboratory - NATA # 1261 Site # 18217											X		X
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	WP1	Jun 30, 2023		Water	S23-Jn0070958	X	X	X	X	X		X	
2	WP2	Jun 30, 2023		Water	S23-Jn0070959	X	X	X	X	X		X	
3	WP2 - DP1	Jun 30, 2023		Water	S23-Jn0070960	X	X	X	X	X		X	
4	QA100	Jun 30, 2023		Water	S23-Jn0070961		X	X	X		X		X
Test Counts						6	4	4	4	4	4	4	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR: RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Chlorophyll a			ug/L	< 2			2	Pass	
Oil & Grease (HEM)			mg/L	< 10			10	Pass	
Phosphate total (as P)			mg/L	< 0.01			0.01	Pass	
Total Nitrogen (as N)			mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C			mg/L	< 5			5	Pass	
Turbidity			NTU	< 1			1	Pass	
LCS - % Recovery									
Oil & Grease (HEM)			%	102			70-130	Pass	
Phosphate total (as P)			%	104			70-130	Pass	
Total Nitrogen (as N)			%	95			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C			%	102			70-130	Pass	
Turbidity			%	100			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Total Suspended Solids Dried at 103 °C to 105 °C	S23-Jn0071058	NCP	%	99			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Phosphate total (as P)	M23-JI0012347	NCP	mg/L	0.12	0.11	12	30%	Pass	
Total Nitrogen (as N)	M23-JI0012347	NCP	mg/L	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	S23-JI0000216	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Turbidity	R23-Jn0047243	NCP	NTU	250	250	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Hannah Mawbey	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Inorganic
Ryan Phillips	Senior Analyst-Inorganic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Stantec

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Contact Person:	Claire Corbett	Project Name:	Downer Sydney Metro Stations - Wiley Park
Telephone Number:	0439 088 345	Project Number:	304500142
Alternative Contact:	Chong Zheng	PO No.:	
Telephone Number:	0451 780 991	Project Specific Quote No. :	190408CDNN_1
Sampler:	CZ / CC	Turnaround Requirements:	5 Days TAT
Email Address (results and invoice):	claire.corbett@cardno.com.au; chong.zeng@cardno.com.au; ContamNSW@cardno.com.au	Lab:	ALS : 277-289 Woodpark Rd, Smithfield NSW 2164
Address: Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia		Attn:	Sample Receipt

Sample Information						Analysis Required									Comments
Cardno Sample ID	Laboratory Sample ID	No. Containers	Preservation	Date sampled	Matrix		TSS	Turbidity	Oil and Grease	Total Phosphorus	Total Nitrogen				
QA200		4	ICE	30/06/2023	Water		1	1	1	1	1				

Environmental Division Sydney
Work Order Reference
ES2321814

Telephone : - 61-2-8784 8555

Relinquished by:	Chong Zeng	Received by:		Relinquished by:		Received by:	FAT:	Relinquished by:	
(name / company)	Stantec	(name / company)		(name / company		(name / company)		(name / company)	
Date & Time:	30/06/2023	Date & Time:		Date & Time:		Date & Time:		Date & Time:	
Signature:	CZ	Signature:		Signature:		Signature:	30/6/23 1.45	Signature:	
Received by:		Relinquished by:		Received by:		Relinquished by:		*Lab use:*	
(name / company)		(name / company)		(name / company		(name / company)		Samples Received: Cool or Ambient (circle one)	
Date & Time:		Date & Time:		Date & Time:		Date & Time:		Temperature Received at:	(if applicable)
Signature:		Signature:		Signature:		Signature:		Transported by: Hand delivered / courier	

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2321814**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: claire.corbett@cardno.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Page	: 1 of 2
Order number	: ----	Quote number	: EP2022MWHAUS0030 (EN/024/)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CZ/CC		

Dates

Date Samples Received	: 30-Jun-2023 13:45	Issue Date	: 30-Jun-2023
Client Requested Due Date	: 06-Jul-2023	Scheduled Reporting Date	: **06-Jul-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 6.3'C - Ice present
Receipt Detail	: HARD ESKY	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EA045 Turbidity	WATER - EP020 Oil & Grease (O&G)	WATER - NT-11 Total Nitrogen and Total Phosphorus
ES2321814-001	30-Jun-2023 00:00	QA200	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS ADDRESS

- A4 - AU Tax Invoice (INV)	Email	sapinvoices@stantec.com

CHONG ZENG

- *AU Certificate of Analysis - NATA (COA)	Email	chong.zeng@cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chong.zeng@cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chong.zeng@cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chong.zeng@cardno.com.au
- A4 - AU Tax Invoice (INV)	Email	chong.zeng@cardno.com.au
- Chain of Custody (CoC) (COC)	Email	chong.zeng@cardno.com.au
- EDI Format - ESDAT (ESDAT)	Email	chong.zeng@cardno.com.au
- EDI Format - XTab (XTAB)	Email	chong.zeng@cardno.com.au

CLAIRE CORBETT

- *AU Certificate of Analysis - NATA (COA)	Email	claire.corbett@cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	claire.corbett@cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	claire.corbett@cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	claire.corbett@cardno.com.au
- A4 - AU Tax Invoice (INV)	Email	claire.corbett@cardno.com.au
- Chain of Custody (CoC) (COC)	Email	claire.corbett@cardno.com.au
- EDI Format - ESDAT (ESDAT)	Email	claire.corbett@cardno.com.au
- EDI Format - XTab (XTAB)	Email	claire.corbett@cardno.com.au

CONTAM NSW

- *AU Certificate of Analysis - NATA (COA)	Email	contamnsw@cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	contamnsw@cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	contamnsw@cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	contamnsw@cardno.com.au
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- EDI Format - ESDAT (ESDAT)	Email	contamnsw@cardno.com.au
- EDI Format - XTab (XTAB)	Email	contamnsw@cardno.com.au

CERTIFICATE OF ANALYSIS

Work Order	: **ES2321814**	Page	: 1 of 2
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 30-Jun-2023 13:45
Order number	: ----	Date Analysis Commenced	: 01-Jul-2023
C-O-C number	: ----	Issue Date	: 06-Jul-2023 10:39
Sampler	: CZ/CC		
Site	: ----		
Quote number	: EN/024/		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QA200	----	----	----	----
			Sampling date / time	30-Jun-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2321814-001	--------	--------	--------	--------
				Result	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	3.2	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.56	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.4	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	4.0	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.35	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **ES2321814**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 30-Jun-2023
Order number	: ----	Date Analysis Commenced	: 01-Jul-2023
C-O-C number	: ----	Issue Date	: 06-Jul-2023
Sampler	: CZ/CC		
Site	: ----		
Quote number	: EN/024/		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 5152564)									
ES2321576-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	88	94	6.8	0% - 50%
ES2321790-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	90	88	1.4	0% - 50%
ES2321915-016	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
ES2321917-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	26	26	0.0	No Limit
EA045: Turbidity (QC Lot: 5146289)									
ES2321311-001	Anonymous	EA045: Turbidity	----	0.1	NTU	184	176	4.4	0% - 20%
ES2321590-001	Anonymous	EA045: Turbidity	----	0.1	NTU	1.9	2.1	9.4	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5147106)									
ES2321698-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	75.3	71.9	4.6	0% - 20%
ES2321743-009	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.02	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5147101)									
ES2321698-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	22.2	36.4	48.6	0% - 50%
ES2321743-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5147102)									
ES2321698-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	24.5	25.6	4.3	0% - 20%
ES2321743-009	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 5152564)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.0	83.0	129
				<5	1000 mg/L	99.6	82.0	110
				<5	926 mg/L	91.6	83.0	118
EA045: Turbidity (QCLot: 5146289)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	100	91.0	105
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5147106)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5147101)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.7	69.0	101
				<0.1	1 mg/L	95.5	70.0	118
				<0.1	5 mg/L	95.2	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5147102)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.1	71.3	126
				<0.01	0.442 mg/L	89.0	71.3	126
				<0.01	1 mg/L	98.1	70.0	130
EP020: Oil and Grease (O&G) (QCLot: 5152112)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	93.7	81.0	121
				<5	4000 mg/L	82.9	70.0	110

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5147106)							
ES2321698-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5147101)							
ES2321721-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5147102)							
ES2321721-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2321814**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 30-Jun-2023
Site	: ----	Issue Date	: 06-Jul-2023
Sampler	: CZ/CC	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES2321698--001	Anonymous	**Nitrite + Nitrate as N**	-----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	ES2321721--001	Anonymous	**Total Kjeldahl Nitrogen as N**	-----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK067G: Total Phosphorus as P by Discrete Analyser	ES2321721--001	Anonymous	**Total Phosphorus as P**	-----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / *Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
QA200	**30-Jun-2023**	----	-----	----	**05-Jul-2023**	07-Jul-2023	✓
EA045: Turbidity							
Clear Plastic Bottle - Natural (EA045)							
QA200	**30-Jun-2023**	----	-----	----	**01-Jul-2023**	02-Jul-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
QA200	**30-Jun-2023**	----	-----	----	**04-Jul-2023**	28-Jul-2023	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
QA200	**30-Jun-2023**	**03-Jul-2023**	28-Jul-2023	✓	**04-Jul-2023**	28-Jul-2023	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
QA200	**30-Jun-2023**	**03-Jul-2023**	28-Jul-2023	✓	**04-Jul-2023**	28-Jul-2023	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
QA200	**30-Jun-2023**	----	-----	----	**05-Jul-2023**	28-Jul-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	4	49	**8.16**	**8.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	5	40	**12.50**	**12.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	19	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	3	49	**6.12**	**6.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)

APPENDIX 2 – SURFACE WATER MONITORING REPORT WILEY PARK STATION – 15 SEPTEMBER 2023

Surface Water Monitoring Report - Wiley Park Station

Construction-Phase Quarterly Dry-Weather Event (15 September 2023)

9 July 2024

Prepared for:

Downer EDI Works Pty Ltd

Prepared by:

Stantec Australia

Revision	Description	Author		Quality Check		Independent Review	
RevA	Draft	Chong Zeng	9/10/2023	Mike Jorgensen	9/10/2023	N/A	N/A
Rev0	Final		9/07/2024		9/07/2024	Callum Laker	9/07/2024

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Abbreviations

MSB	Metro Services Building
SWMP	Soil and Water Management Plan
DO	Dissolved oxygen
EC	Electrical conductivity
pH	Potential of hydrogen
ORP	Oxidation-reduction potential
NATA	National Association of Testing Authorities, Australia
QA/QC	Quality assurance/quality control
TSS	Total Suspended Solids
CoA	Conditions of Approval
DQO	Data Quality Objective
DQIs	Data Quality Indicators
RPD	Relative Percentage Difference
LORs	limits of reporting
CoC	Chain-of-Custody

Unit

NTU	Nephelometric Turbidity Units
µS/cm	MicroSiemens per Centimeter
µg/L	Microgram per Liter

1.0 INTRODUCTION

1.1 BACKGROUND

Stantec Australia Pty Ltd ("Stantec" – formerly Cardno) was commissioned by Downer EDI Works Pty Ltd ("Downer EDI") to undertake monitoring and reporting of surface water quality of the unnamed channel near the Wiley Park Station Upgrade worksite. The proposed upgrade includes the upgrade of the main station and installation of the Metro Services Building (MSB).

Surface water quality of the channel near the Wiley Park Upgrade Site is to be monitored as per the requirements summarised in the **Table 1-2**, which is excerpted from the Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades Soil and Water Management Plan (SWMP). The monitoring program was prepared to meet the requirements outlined in The Sydney Metro City and Southwest – Sydenham to Bankstown Upgrade Conditions of Approval SSi-8256, specifically Condition 8 to Condition 10. The sampling locations (WP1 – Upstream and WP2 – Downstream) of the water quality monitoring are shown on **Figure 1** in **Appendix A**. In order to establish a more robust dataset of how the downstream discharge from the worksite affects the water quality, Downer EDI requested two additional sampling locations at the downstream discharge points (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) of the water quality monitoring since May 2022. This additional sampling at the downstream discharge points is subject to the flow contribution at the time of each monitoring event. Refer to **Figure 1** in **Appendix A** for approximate locations of the sampling locations.

The closest Project worksite to an existing watercourse is the Wiley Park Station services building, which is located approximately 100 m from an unnamed concrete-lined channel, which forms the upper reaches of Coxs Creek and is identified as a first-order stream.

For the purpose of establishing baseline water quality data within the first-order stream at Wiley Park, water quality monitoring was intended to be undertaken for a period prior to construction of the Wiley Park services building as outlined in the Table 13 of the SWMP. At a minimum, one dry-weather sample and one wet weather sample (weather permitting) were intended to be collected during the pre-construction period. The frequency of pre-construction water quality monitoring within this channel was subject to water being present within the structure. However, during the baseline monitoring period no wet-weather event was able to be captured prior to commencement of construction. A dry-weather baseline monitoring event was undertaken on 10 March 2021.

This report presents the findings from the seventeenth surface water monitoring event, which was undertaken by Stantec on 15 September 2023. The event undertaken was a construction-phase quarterly dry-weather event. It is noted that although this event is considered as a construction-phase monitoring event, no work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification as suggested by Downer EDI. **Table 1-1** below summarised the surface water monitoring events undertaken to date by Stantec.

Table 1-1 Summary of Surface Water Monitoring Event Undertaken to Date

Date of Monitoring	Type of Event	Report Reference
10 March 2021	Pre-construction Dry Baseline	4NE30187_R001_SWM_WileyPark_Rev0
20 March 2021	Construction-Phase Wet Weather	4NE30187_R001_SWM_WileyPark_Rev0
5 May 2021	Construction-Phase Wet Weather	4NE30187_R002_SWM_WileyPark_Rev0
1 July 2021	Construction-Phase Dry Weather	NE30161_R003_SWM_WileyPark_Rev0
30 September 2021	Construction-Phase Dry Weather	NE30161_R004_SWM_WileyPark_Rev0
12 November 2021	Construction-Phase Wet Weather	NE30161_R005_SWM_WileyPark_Rev0
26 November 2021	Construction-Phase Wet Weather	NE30161_R005_SWM_WileyPark_Rev0
9 and 10 February 2022	Construction-Phase Dry Weather	NE30161_R006_SWM_WileyPark_Rev0
23 February 2022	Construction-Phase Wet Weather	NE30161_R007_SWM_WileyPark_Rev0
9 March 2022	Construction-Phase Wet Weather	NE30161_R008_SWM_WileyPark_Rev0
24 May 2022	Construction-Phase Wet Weather	NE30161_R009_SWM_WileyPark_Rev0
4 and 21 July 2022	Construction-Phase Wet Weather	304100142_R010_SWM_WileyPark_Rev0
25 August 2022	Construction-Phase Dry Weather	304100142_R011_SWM_WileyPark_Rev0
25 November 2022	Construction-Phase Dry Weather	304100142_R012_SWM_WileyPark_Rev0
22 February 2023	Construction-Phase Wet Weather	304100142_R013_SWM_WileyPark_Rev0
30 June 2023	Construction-Phase Dry Weather	304500142_R014_SWM_WileyPark_Rev0
15 September 2023	Construction-Phase Dry Weather	304500142_R015_SWM_WileyPark_Rev0

1.2 PURPOSE AND OBJECTIVE

The purpose of the surface water monitoring works is to monitor and record surface water quality within the unnamed channel in accordance with the monitoring program as outlined in the site's SWMP. The objective of the works is to evaluate whether construction activities are impacting water quality downstream of the project footprint in the unnamed channel. The evaluation entailed comparing water quality of samples collected upstream of the worksite discharge points with water quality downstream of the discharge points.

1.3 SCOPE OF WORKS

Stantec undertook the following tasks during the surface water monitoring event:

- Inspected and sampled the two nominated surface water sampling locations (WP1 – Upstream and WP2 – Downstream) on 15 September 2023 as a construction-phase quarterly dry-weather monitoring event.
- Inspected two additional nominated downstream discharge points locations (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) and sampled on one of the additional nominated downstream discharge point locations (WP2-DP1) on 15 September 2023 as part of construction-phase quarterly dry-weather monitoring event. No sampling work was undertaken at the downstream discharge point – WP2-DP2 due to dry condition.
- Recorded field parameters (measured using a calibrated water quality meter) and noted observations of the water bodies during sampling. Field parameters measured included:

  - Dissolved oxygen (DO).
  - Electrical conductivity (EC).
  - Potential of hydrogen (pH).
  - Oxidation-reduction potential (ORP).
  - Temperature.
- Collected three primary surface water samples from WP1, WP2 and WP2-DP1, one intra-lab duplicate sample and one inter-lab duplicate sample per sampling event for submission to a laboratory accredited by the National Association of Testing Authorities, Australia (NATA) for the requested analytical testing of primary and additional quality assurance/quality control (QA/QC) samples. Samples were submitted for analysis of:
  - Oil & Grease.
  - Total Suspended Solids (TSS).
  - Nutrients (Total Phosphorous, Total Nitrogen).
  - Turbidity.
  - Chlorophyll-a.
- Reviewed the analytical and field data and prepared this report.

Details of the monitoring program are shown below in the **Table 1-2**, which is excerpted from the Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades SWMP.

Table 1-2 Wiley Park Water Quality Monitoring Program

Wiley Park Water Quality Monitoring Program	
Waterway	Sydney Water Cooks River Channel (first-order stream)
Indicative inspection and / or monitoring points	WP1 – upstream
	WP2 – downstream
	WP2-DP1- downstream eastern discharge point[1]
	WP2-DP2 – downstream western discharge point[1]
Interaction with project works	Channel near the Wiley Park service building site
Pre-construction works	Monthly for parameters detailed in Table 11 of the site's SWMP (including at least one dry-weather round of sampling). One wet-weather event, if possible, for the parameters detailed in Table 11, subject to event occurrence, safe conditions for monitoring and access being available to conduct monitoring. Note: A wet-weather event is when the receiving area has received greater than 20 mm of rain in 24 hours. The sampling was undertaken immediately during construction hours and if it is safe to do so.
During construction of the Wiley Park services building	Quarterly for parameters detailed in Table 11 of the site's SWMP (including during dry weather). Four wet-weather events per year for the parameters in Table 11, subject to event occurrence, safe conditions for monitoring and access being available to conduct monitoring. Note: A wet-weather event is when the receiving area has received greater than 20mm of rain in 24 hours. The sampling was undertaken immediately during construction hours and if it is safe to do so.

Notes to Table

1 In order to establish a more robust dataset of how the downstream discharge from the worksite affects the water quality, Downer EDI requested two additional sampling locations at the downstream discharge points (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) of the water quality monitoring since May 2022. This additional sampling at the downstream discharge points is subject to the flow contribution at the time of each monitoring event.

2.0 GUIDELINES AND LEGISLATION

There are a range of Guidelines and Legislation and Conditions of Approval (CoA) that are applicable to the surface water monitoring program that are summarised below.

The CoA applicable to this job include:

- The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Conditions of Approval SSI-8256, determined 12 December 2018.

The State and Federal legislation and policy and guidelines that apply to the program include:

- Environmental Planning and Assessment Act 1979 (EP&A Act).
- Contaminated Land Management Act 1997.
- Protection of the Environment Operations Act 1997 (POEO Act).
- Water Management Act 2000 Water Management (General) Regulation 2018.

Additional guidelines and standards to the management of soil and water include:

- Landcom (2004). Managing Urban Stormwater: Soils and Construction. (Volume 1 of the 'Blue Book').
- DECC (2008). Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction. (Volume 2D of the 'Blue Book').
- ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the 'ANZECC Guidelines').
- ANZECC (2018). Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting (collectively known as the 'ANZECC Guidelines').
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines').

3.0 MONITORING AND INSPECTION LOCATIONS

Details of the inspection and / or monitoring locations are provided in **Table 3-1**. The approximate locations are provided in **Appendix A**. Representative photographs are presented in **Appendix B**.

Table 3-1 Surface Water Monitoring Location Details

Sample Location	Approx. Latitude	Approx. Longitude	Description
WP1 (up-stream)	-33.924014	151.065315	Immediately south of the Boulevarde and east of 118 the Boulevarde.
WP2 (down-stream)	-33.923339	151.064970	Immediately north of the Urunga Parade and west of 4 Urunga Parade.
WP2-DP1 (downstream eastern discharge point)	-33.923543	151.065058	Immediately south of the Urunga Parade, east side of the channel, approximately 20 m south of WP2.
WP2-DP2 (downstream western discharge point)	-33.923529	151.065048	Immediately south of the Urunga Parade, west side of the channel, approximately 20 m south / upstream of WP2.

4.0 QUALITY MANAGEMENT

The Data Quality Objective (DQO) process is used to establish a systematic planning approach to setting the type, quantity and quality of data required for making decisions based on the environmental condition of the project area. The DQO process involves the seven steps detailed in **Table 4-1**.

Table 4-1 Data Quality Objectives

DQO	Description
Step 1 State the Problem	Construction work may adversely impact the local surface water quality within the unnamed channel near the site.
Step 2 Identify the Decisions	Are there any impacts to surface water quality from construction activities at the site?
Step 3 Identify Inputs to the Decision	The primary inputs to the decisions described above are: • Assessment of surface water quality of the unnamed channel within proximity to Wiley Park service building site per the requirements outlined in the site's SWMP, with samples collected from the nominated monitoring locations (upstream and downstream of the site); • Laboratory analysis of surface water samples for relevant parameters; • Assessment of the suitability of the analytical data obtained, against the Data Quality Indicators (DQIs); • Assessment of the analytical results against applicable guideline criteria; and • Aesthetic observations of surface water bodies, including odours, sheen and condition, if encountered.
Step 4 Define the Study Boundaries	The lateral extent of the study area is the channel near the Wiley Park service building site. The temporal boundaries of the study comprises the duration of the monitoring program, including pre-construction monitoring, construction phase, and post-construction monitoring as required.
Step 5 Develop a Decision Rule	The decision rules for the water quality monitoring sampling events included: • Were primary and QA/QC samples analysed using methods endorsed by relevant regulatory guidelines at laboratories NATA-accredited for the requested analyses? • Did the field and laboratory QA/QC results indicate that the data set was reliable and representative of the water quality with Relative Percentage Difference (RPD) values of 30% or less? • Were the laboratory limits of reporting (LORs) below the applicable guideline criteria for the analysed parameters? • Were guideline criteria sourced from endorsed guidelines? • Were surface water aesthetic characteristics evaluated including odours and sheen? • Were the monitoring results obtained from the downstream sample collected during construction phase greater than the upstream sample collected during the same monitoring event? If so, then the adverse impact to the quality of water in the unnamed channel is considered to have potentially occurred.
Step 6 Specify Limits on Decision Error	In accordance with the relevant guidelines as endorsed under the Contaminated Land Management Act 1997. Specific limits for this project are in accordance with the appropriate guidance made or endorsed by state and national regulations, appropriate indicators of data quality, and standard procedures for field sampling and handling. This step also examines the certainty of conclusive statements based on the available new Site data collected. This should include the following points to quantify tolerable limits:

DQO	Description
	• A decision can be made based on a certainty assumption of 95% confidence in any given data set (excluding asbestos). A limit on the decision Type I error will be 5% (alpha) that a conclusive statement may be a false positive. Type II error rate (false negative) would be higher (typically around 0.2). A decision error in the context of the decision rule presented above would lead to either underestimation or overestimation of the risk level associated with a particular sampling area. Decision errors may include: • Sampling errors may occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the Site. To address this, minimum numbers of samples are proposed to be collected from each media. As such, there may be limitations in the data if aspects of the sampling plan cannot be implemented. Some examples of this scenario include but not limited to: – Proposed samples are not collected due to lack of water flow or access being restricted to a given location. • Limitations in ability to acquire useful and representative information from the data collected. The data are proposed to be collected from multiple locations and sample media. • Measurement errors can occur during sample collection, handling, preparation, analysis and data reduction. To address this the following measures are proposed: – Field staff to follow a standard procedure when undertaking samples, including decontamination of tools, removal of adhered soil to avoid false positives in results, collection of representative samples and use of appropriate sample containers and preservation methods. – Laboratories to follow a standard procedure when preparing samples for analysis and undertaking analysis. – Laboratories to report quality assurance/ quality control data for comparison with the DQIs established for the project
Step 7 Optimise the Design for Obtaining Data	To achieve the DQOs and DQIs, the following sampling procedures were implemented to optimise the design for obtaining data: • Surface water samples was collected from upstream and downstream sampling locations, as available due to access and water level; • Surface water samples was collected from 2 discharge points between upstream and downstream, as available due to access and water level; • Surface water parameters were selected based on project monitoring requirements provided to Stantec; • Samples were collected by suitably qualified and experienced environmental scientists; • Samples were collected and preserved in accordance with relevant standards/guidelines; and • Field and laboratory QA/QC procedures were adopted and reviewed to indicate the reliability of the results obtained.

4.1 DATA QUALITY INDICATORS

The following DQIs have been adopted for the project. The DQIs outlined in **Table 4-2** assist with decisions regarding the usefulness of the data obtained, including the quality of the laboratory data.

Table 4-2 Summary of Data Quality Indicators

Data Quality Indicator	Frequency	Data Acceptance Criteria
Completeness		
Field documentation correct	All samples	The work was documented in accordance with Stantec SOPs

Data Quality Indicator	Frequency	Data Acceptance Criteria
Suitably qualified and experience sampler	All samples	Person deemed competent by Stantec collecting and logging samples
Appropriate lab methods and limits of reporting (LORs)	All samples	Samples were analysed using methods endorsed by relevant regulatory guidelines at laboratories NATA-accredited for the requested analyses.
Chain of custodies (COCs) completed appropriately	All samples	The work was documented in accordance with Stantec SOPs
Sample holding times complied with	All samples	The samples were extracted and analysed within holding times specified by the project NATA-accredited laboratory
Proposed/critical locations sampled	-	Proposed/critical locations sampled
Comparability		
Consistent standard operating procedures for collection of each sample. Samples should be collected, preserved and handled in a consistent manner	All samples	All works undertaken in accordance with Stantec SOPs
Experienced sampler	All samples	Person deemed competent by Stantec collecting and logging samples
Climatic conditions (temp, rain etc) recorded and influence on samples quantified (if required)	All samples	Climatic conditions documented in field sheets
Consistent analytical methods, laboratories and units	All samples	Sample analysis to be in accordance with NATA-approved methods
Representativeness		
Sampling appropriate for media and analytes (appropriate collection, handling and storage)	All samples	Sample analysis to be in accordance with NATA-approved methods
Samples homogenous	All samples	All works undertaken in accordance with Stantec SOPs
Detection of laboratory artefacts, e.g. contamination blanks	-	Laboratory artefacts assessed and impact on results determined
Samples extracted and analysed within holding times	All samples	The samples were extracted and analysed within holding times specified by the laboratory
Precision		
Blind duplicates (intra-laboratory duplicates)	1 per 20 samples	Less than or equal to 30% RPD No Limit RPD result less than 10 × LOR
Split duplicates (inter-laboratory duplicates)	1 per 20 samples	Less than or equal to 30% RPD No Limit RPD result less than 10 × LOR
Laboratory duplicates	1 per 20 samples	Results greater than 10 x LOR:less than or equal to 30% RPD Results less than 10 x LOR: No limit on RPD
Accuracy (Bias)		
Surrogate spikes	All organic samples	50-150%
Matrix spikes	1 per 20 samples	70-130%

Data Quality Indicator	Frequency	Data Acceptance Criteria
Laboratory control samples	1 per 20 samples	70-130%
Method blanks	1 per 20 samples	Less than LOR

The DQOs and DQIs for the project were met during the monitoring events. Discussion of the Quality Control / Quality Assurance assessment is provided in **Appendix E**.

5.0 FIELD INVESTIGATION

The scope and method of the surface water monitoring is summarised in **Table 5-1**.

Table 5-1 Investigation Activity Summary

Activity	Details
Dates of Fieldwork	15 September 2023
Surface Water Inspection and Monitoring	All 4 nominated locations outlined in **Section 3.0** were inspected during the course of the field work undertaken on 15 September 2023 with 3 nominated locations monitored including WP1 – upstream, WP2 – downstream, WP2-DP1 – downstream eastern discharge point. No monitoring was undertaken at WP2-DP2 (downstream western discharge point) due to the dry condition at WP2-DP2 at the time of fieldwork undertaken. Stantec undertook the inspection and/or monitoring per the following procedures: Surface water body inspection - The general site condition was inspected prior to commencement of field works for signs of any site activities that may have altered the surface water contamination status or require modifications to the field or laboratory works program. Each nominated location was inspected for indicators of contamination and the presence as well as the flow of surface water. This information is recorded on the field sheets presented in **Appendix C**. Surface water sampling – Subject to the flow contribution at each nominated location during the field work undertaken, field parameters and visual/olfactory observations were recorded prior to sampling at each nominated location. Physico-chemical parameters including pH, electrical conductivity (EC), dissolved oxygen (DO), reduction-oxidation potential (redox), and temperature were measured using a calibrated water quality meter. Surface water samples were collected either directly into the sampling bottle or directly from the telescopic scoop. Once field parameters were recorded, the surface water samples were transferred to appropriately preserved sample containers provided by the laboratories. Field observations, and parameters are presented in **Appendix C**. Samples were placed in laboratory supplied containers and stored on ice in a sealed ice box (esky) while onsite and in transit to the NATA-accredited laboratories for the targeted analyses.
Surface Water Analysis	Surface water samples from the monitoring event were submitted under standard chain-of-custody (CoC) procedures to NATA-accredited Eurofins Environment Testing Australia analysis of the parameters as follows: • Oil & Grease; • Total Suspended Solids (TSS); • Nutrients (Total Phosphorous, Total Nitrogen); • Turbidity; and • Chlorophyll-a. Tabulated laboratory results are presented in **Appendix D**. The Data QA /QC program and data quality review including calibration certificates is presented in **Appendix E**. Copies of the original laboratory reports, NATA-stamped laboratory certificates, and CoC documentation are included in **Appendix F**.
Decontamination	In the event of reusable sampling or monitoring equipment (telescopic scoop, water quality meter) was used decontamination was undertaken. Decontaminated between locations using a standard bucket wash. Equipment was washed in phosphate-free detergent (Liquinox) and rinsed in laboratory supplied rinsate water.

6.0 SURFACE WATER ASSESSMENT CRITERIA

The assessment criteria for surface water analytical and field data were adopted from Table 11 of the site's SWMP. The criteria for selected parameters are provided in **Table 6-1** below. ANZECC guideline criteria are included in the table for reference.

Table 6-1 Water Quality Monitoring Parameters and Adopted Criteria at Wiley Park

Parameter	ANZECC Criteria – Freshwater[1]	Proposed Trigger Values	Proposed Actions
Temperature (°C)	>80% ile; <20% ile	Downstream results are greater than upstream results in rainfall events up to and including the significant event threshold of greater than 20 mm in 24 hours. Downstream results are greater than upstream results during dry-weather sampling.	Environment Manager (or delegate) to re-test to confirm results and undertake an inspection of the adjacent works and propose actions where required.
Dissolved Oxygen (DO)	Lower limit – 85% Upper limit -110%		
Turbidity (NTU)	6-50 NTU		
Oil and grease	-		
pH	Lower limit – 6.5 Upper limit – 8.5		
Salinity (as EC)	125 – 2200 µS/cm		
Total Suspended Solids (TSS)	-		
Total Phosphorus as P	25 µg/L		
Total Nitrogen as N	350 µg/L		
Chlorophyll-a	3 µg/L		

Note to Table

1 ANZECC guideline criteria are included for reference. It is noted that for dry weather events baseline testing comparison will indicate whether this existing water quality within the channel meet ANZECC guidelines, prior to construction of the services building. For wet weather events where no baseline data is available a direct comparison to upstream and downstream results is undertaken. Sydney Metro's Principal Contractor will comply with Section 120 of the Protection of the Environment Operations Act 1997.

7.0 SUMMARY OF RESULTS

7.1 SUMMARY OF FIELD OBSERVATIONS

All 4 nominated monitoring locations were inspected (WP1, WP2, WP2-DP1 and WP2-DP2) on 15 September 2023. A total of 3 surface water sampling locations (WP1, WP2 and WP2-DP1) were able to be monitored and sampled whereas the WP2-DP2 sampling location was not able to be monitored and sampled due to the dry condition during the time of fieldwork undertaken on 15 September 2023. Photos of each nominated location are included in **Appendix B**. The following observations were made:

7.1.1 Construction-Phase Quarterly Dry-Weather Event – 15 September 2023

- The sampling event was undertaken on 15 September 2023 during a dry-weather event with 0 mm precipitation over the last 24 hours prior to the field sampling (rainfall data was obtained from the closest Bureau of Meteorology weather station, i.e. Canterbury Racecourse AWS – BOM Station ID: 066194). Refer to **Appendix C** for a copy of the weather recordings obtained from the Bureau of Meteorology website (http://www.bom.gov.au/);
- Observation of water body:
  - WP 1 (upstream of work area) contained low flowing clear water with low turbidity. No visible oil sheen observed from the water surface. The estimated depth of the water body was 0.05 m.
  - WP 2 (downstream of work area) contained low flowing clear water with low turbidity. No visible oil sheen observed from the water surface. The estimated depth of the water body was 0.05 m.
  - WP2-DP1 (downstream eastern discharge point) contained very low flowing clear water with low turbidity. The flow contribution from this discharge point is considered minor with estimated depth of the water body to be less than 0.01 m. Significant algae growth was observed at this discharge point.
  - WP2-DP2 (downstream western discharge point) was dry. No contribution to the water body was observed during the time of sampling.
- Additional observation:
  - One discharge point (WP1-DP1) was observed immediately downstream / north of WP1. No flow contribution was observed at the time of sampling. Refer to **Appendix A** for approximate location of WP1-DP1. Refer to **Appendix B** for a detailed photo.

7.2 FIELD PARAMETERS

The parameters from each location sampled are presented in **Table 7-1**.

Table 7-1 Laboratory Physico-chemical Parameters and Field Observations – 15 September 2023

Location ID / Field Perimeter	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream eastern discharge point)
Water Depth (m)	0.05	0.05	<0.01
Estimated Flow Rate	low	low	very low

Location ID / Field Perimeter	WP1 (upstream)	WP2 (downstream)	WP2-DP1 (downstream eastern discharge point)
Temperature (°C)	15.8	18.8	22.0
pH	6.76	8.86	9.35
Electrical Conductivity (µS/cm)	496.5	447.9	622.0
Dissolved Oxygen (mg/L)	10.15	6.46	6.16
Dissolved Oxygen (%)	103.8	70.0	70.6
Oxidation-Reduction Potential (mV)	138.4	89.5	148.7
SHE[1] Redox Potential (mV)	349.6[2]	298.3[2]	355.5[2]
Condition	Clear Low turbidity	Clear Low turbidity	Clear with some dark brown suspended solid observed. Significant algae growth was observed at this discharge point. Low turbidity

Note to Table

1 SHE – Standard Hydrogen Electrode

2 Water quality meter utilised on the day of monitoring contains Ag/AgCl reference electrode with 3.5 M KCl filling solution. As such, SHE was calculated based on Table 1 of US EPA document: SESDPROC-113-R2, Field Measurement of Oxidation-Reduction Potential (ORP).

7.3 SURFACE WATER ANALYTICAL RESULTS

Laboratory analytical results for the surface water samples collected are presented in **Appendix D**. Copies of the original laboratory reports, NATA-stamped laboratory certificates, and Chain of Custody documentation are included in **Appendix F**.

7.3.1 Construction-Phase Dry-Weather Event – 15 September 2023

The analytical results of the monitoring event indicate that:

- Concentrations of Chlorophyll-a were reported below adopted assessment criteria and laboratory LOR (<2 µg/L) at all sample locations with exception of WP2-DP1 detected at 4.1 µg/L;
- Concentrations of Oil and Grease were reported below laboratory LOR (10 mg/L) at all sample locations;
- Concentrations of nutrients (total nitrogen and the total phosphorous) were reported:
  - Total nitrogen:
    - WP1: 1.0 mg/L
    - WP2: 1.1 mg/L
    - WP2-DP1: 4.5 mg/L
  - Total phosphorous:

    - WP1: <0.01 mg/L
    - WP2: <0.01 mg/L
    - WP2-DP1: 0.06 mg/L
- TSS were reported:
  - WP1: 9.7 mg/L
  - WP2: 6.6 mg/L
  - WP2-DP1: 7.4 mg/L
- Turbidity was reported below the laboratory LOR (<1 NTU).

7.3.2 Baseline Results Comparison

One sampling event during the pre-construction period (baseline event) was undertaken on 10 March 2021. This event has been used for comparison of construction-phase monitoring events under similar conditions (i.e., not triggering the wet-weather event criteria). It should be noted that the baseline water quality monitoring represents a single sampling event and may not be representative of the range of water quality within the channel prior to construction starting.

The parameters from each location sampled are presented in **Table 7-2** compared with the baseline pre-construction event undertaken on 10 March 2021. Overall, conditions are similar in the pre-construction results and the construction-phase sampling event on 15 September 2023. These baseline conditions have been taken into account in the interpretation below. It is noted that due to the scope of work assigned to Stantec by the time of baseline monitoring event, no sampling or monitoring work was undertaken at the downstream discharging points (WP2-DP1 and WP2-DP2) for comparison.

Table 7-2 Comparison of current sampling results to baseline results.

Location ID	Assessment Criteria	WP1 (upstream) Baseline Results 10 March 2021	WP1 (upstream) 15 September 2023	WP2 (downstream) Baseline Results 10 March 2021	WP2 (downstream) 15 September 2023
Temperature (oC)	N/A	21.3	15.8	21.1	18.8
pH	6.5 - 8.5	7.90	6.76	7.61	**8.86**
Electrical Conductivity (µS/cm)	>125 – 2,200	543	496.5	363	622.0
Dissolved Oxygen (%)	85% - 110%	**63**	103.8	**45.9**	**70.6**
Oxidation-Reduction Potential (mV)	N/A	140.7	138.4	181.0	89.5
SHE[1] Redox Potential (mV)	N/A	348.13[2]	349.6[2]	388.43[2]	298.3[2]
Chlorophyll a (µg/L)	>3	**<5**	<2	**<5**	<2
Oil and Grease (mg/L)	Comparison	<10	<10	29	<10
Nitrogen (Total) (mg/L)	>0.35	**2.5**	**1.0**	**1.68**	**1.1**
Phosphorus (mg/L)	>0.025	**0.34**	<0.01	**0.12**	<0.01
TSS (mg/L)	N/A	<1	9.7	<1	6.6
Turbidity (NTU)	>6 - 50	2.9	<1	<1	<1

Note to Table

1 SHE – Standard Hydrogen Electrode

2 Water quality meter utilised on the day of monitoring contains Ag/AgCl reference electrode with 3.5 M KCl filling solution. As such, SHE was calculated based on Table 1 of US EPA document: SESDPROC-113-R2, Field Measurement of Oxidation-Reduction Potential (ORP).

Highlighted cell with the bold font indicates exceedance of the adopted assessment criteria.

7.4 RESULTS DISCUSSION

7.4.1 Comparison to ANZG 2018 / ANZECC 2000 Criteria

Results for the construction-phase dry-weather event sampled on 15 September 2023 generally showed monitored parameters were within the adopted threshold criteria, with the exception of chlorophyll-a, dissolved oxygen, total nitrogen, total phosphorous, and pH:

- Chlorophyll-a measured at WP2-DP1 (4.1 µg/L) was above the adopted criteria, which is consistent with the field observation of the significant algae growth at this discharge point. However, this is not considered to be a significant issue, and this is not considered likely to be a result of the construction activities based on:
  - Chlorophyll-a concentrations measured at both upstream monitoring location (WP1) and downstream monitoring location (WP2) were below the laboratory LOR (<2 µg /L).
  - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that elevated levels of nutrients (nitrogen and phosphorus) were previously identified from this off-site flow contribution. Investigation of this off-site source and associated algae growth was documented in the following report:
    - Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification as suggested by Downer EDI.
- Dissolved oxygen saturation measured at two monitoring locations (WP2-DP1 and WP2) were outside the adopted criteria range. This is not considered to be a significant issue based on the comparison outlined in **Section 7.3.2** indicating the dissolved oxygen saturation measured at the downstream monitoring location (WP2) during this construction-phase dry-weather event is closer to the adopted thresholds than the pre-construction baseline event.
- Total nitrogen measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criterion range with the analytical results of 1.0 mg/L, 1.1 mg/L and 4.5 mg/L for WP1, WP2, and WP2-DP1 respectively. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on the details provided in **Section 7.4.2**.
- Total phosphorous measured at WP2-DP1 (0.06 mg/L) was above the adopted criteria. However, this is not considered to be a significant issue, and this is not considered likely to be a result of the construction activities based on:
  - Total phosphorous concentrations measured at both upstream monitoring location (WP1) and downstream monitoring location (WP2) were below the laboratory LOR (<0.01 mg/L).
  - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that higher level of total phosphorous was previously identified from this off-site flow contribution (0.80 mg/L). Investigation of this off-site source and associated elevated phosphorus concentration was documented in the following report:

    - Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification as suggested by Downer EDI.
- pH measured at WP1 was within the adopted criterion range, whereas pH measured at WP2-DP1 and WP2 (9.35 and 8.86) were above the adopted criterion range (i.e., 6.5 – 8.5).

7.4.2 Comparison of Upstream and Downstream Results

Results between upstream and downstream samples collected during the construction-phase dry-weather event were comparable, with the exception of:

- Chlorophyll-a result at the downstream eastern discharge point (WP2-DP1: 4.1 µg/L) was slightly higher than the upstream sampling point and downstream sampling point which were both measured below the laboratory LOR (<2 µg /L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on the details provided in **Section 7.4.1**.
- Total nitrogen result at the downstream eastern discharge point (WP2-DP1: 4.5 mg/L) and downstream sample location (WP2: 1.1 mg/L) were higher than the upstream sampling point (WP1: 1.1 mg/L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities undertaken because:
  - The total nitrogen concentration at WP2 is only marginally higher than WP1.
  - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that high level of total nitrogen (i.e., an order of magnitude higher than the WP2-DP1 results) was previously identified from this off-site flow contribution. Investigation of this off-site source and associated elevated nitrogen concentration was documented in the following report:
    - Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and fixing as suggested by Downer EDI.
- Total phosphorus result at the downstream eastern discharge point (WP2-DP1: 0.06 mg/L) was slightly higher than the upstream sampling point and downstream sampling point which were both measured below the laboratory LOR (<0.01 mg/L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on the details provided in **Section 7.4.1**.
- The pH results at downstream eastern discharge point sample (WP2-DP1: 9.35) and downstream sample point (WP2: 8.86) were higher than the results measured at the upstream sample location (WP1: 6.76). However, it is not considered likely to be a result of the construction activities based on the discussion provided in **Section 7.4.3**.

- EC result at the downstream sample location (WP2: 622.0 µS/cm) was higher than the upstream sampling point (WP1: 496.5 µS/cm) and downstream eastern discharge point (WP2-DP1: 447.9 µS/cm). However, it is not considered this is a significant issue based on:
  - EC results for all three sampling locations (WP1, WP2, WP2-DP1) measured were within the ANZG 2018 / ANZECC 2000 Criteria.

7.4.3 Trend Assessment – Long-Term pH Monitoring Results

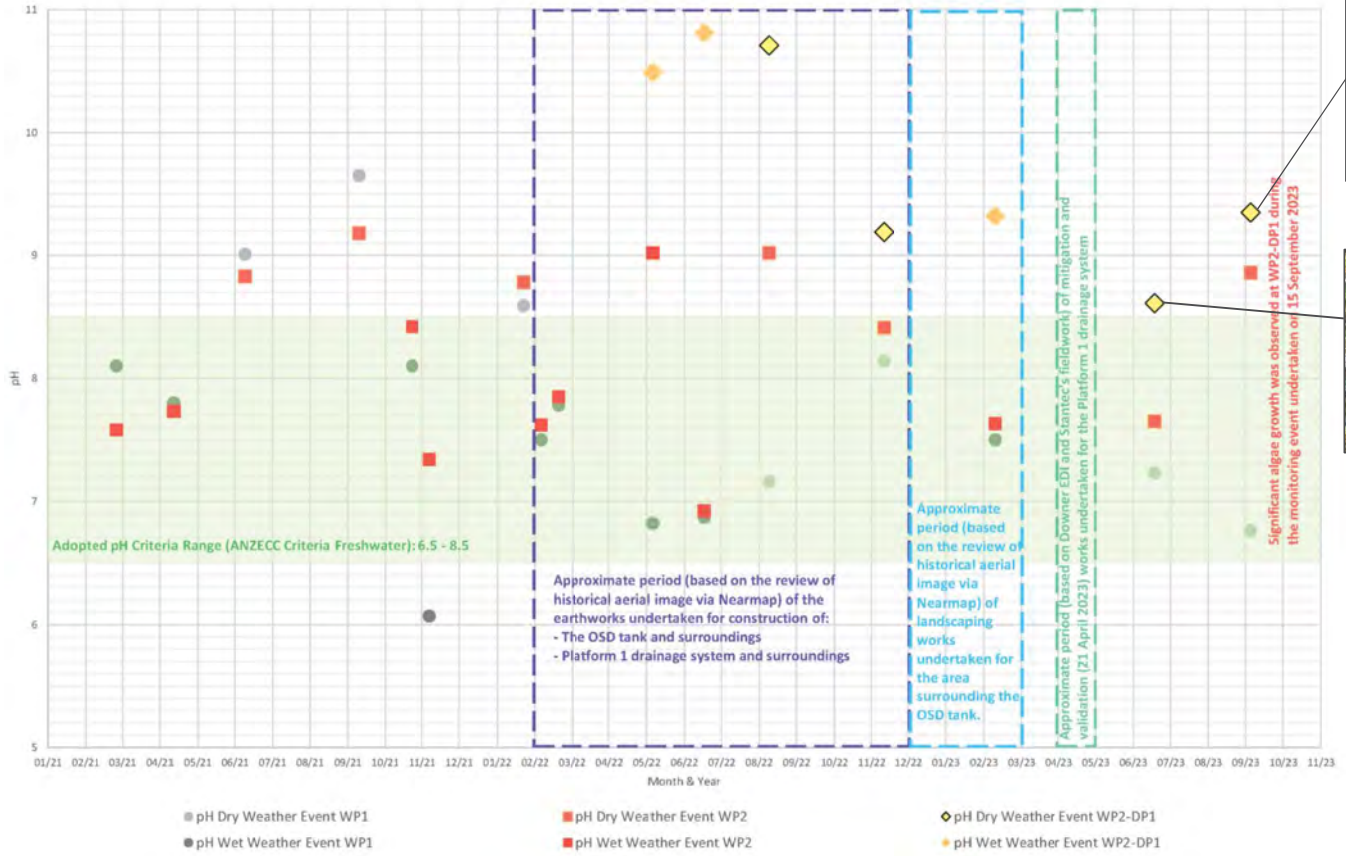
Long-term pH monitoring results (total of 16 monitoring rounds undertaken during the period from March 2021 to September 2023) were plotted in **Graph 1** below to assist the trend assessment. Key findings indicated as following:

- During the period from February 2022 to August 2022, pH exhibited a general increasing trend at WP2 and WP2-DP1. This period overlapped with the period of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings. Based on the results of the source investigations documented in the reports listed below, both construction activities were considered as the potential sources for the elevated pH measured at WP2-DP1.
  - Cardno now Stantec (2022b) *Surface Water Monitoring Report – Wiley Park Station*. Date: 15 September 2022. Revision: Rev0. Report reference: 304100142_R010_SWM_WileyPark_Rev0.
  - Cardno now Stantec (2022c) *Additional pH Source Investigation within the Platform 1 Drainage System at Wiley Park Station*. Date: 9 November 2022. Revision: Rev0. Report reference: 304100142_TM02_Add_pH_Inv_P1_Rev0.
- During the period from August 2022 to June 2023, pH exhibited a general decreasing trend at WP2 and WP2-DP1. This period overlapped with periods of:
  - The ending phase of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings.
  - The landscaping works undertaken for the area surrounding the OSD tank.
  - The mitigation and validation work undertaken for the Platform 1 drainage system. Details of the validation assessment undertaken by Stantec has been documented in the report listed:
    - Stantec (2023) *Validation Test of Wiley Park Station Platform 1 Drainage System 21 April 2023.* Date: 1 May 2023. Revision: RevA. Report reference: 304100142_L003_pH_P1_Val_RevA.
- During the most recent monitoring event undertaken on 15 September 2023, although pH measured from WP2 (8.86) and WP2-DP1 (9.35) were significantly higher than the pH values measured from last monitoring event undertaken on 30 Jun 2023 (WP2: 7.65; WP2-DP1: 8.61), this is not considered likely to be a result of the construction activities undertaken because:
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification as suggested by Downer EDI.
  - As noted in **Section 7.1**, significant algae growth was observed at WP2-DP1 (refer to **Appendix B** for photo) during this round of monitoring likely caused by the warmer weather along with the higher nutrient level measured. This significant algae growth is considered likely to be a source of the elevated pH measured at this location at the time of the monitoring (i.e., algae can absorb

CO_2 dissolved in water during photosynthesis, which causes the aquatic environmental pH to rise).

Summary of Results
July 9, 2024

Graph 1 - Long-Term pH Monitoring Results



8.0 CONCLUSION

Stantec was engaged to undertake surface water monitoring of the unnamed channel west of Wiley Park Station in accordance with the SWMP for the project. The objective of the works was to evaluate whether construction activities are impacting water quality downstream of the project footprint in the unnamed channel that receives in part stormwater from the construction area.

This report presents monitoring data of a construction-phase dry-weather event on 15 September 2023. Based on the investigation results obtained, following conclusions are made:

- ANZG 2018 / ANZECC 2000 comparison and assessment:
  - During this construction-phase dry-weather monitoring event, monitored parameters were either within the adopted ANZG 2018 / ANZECC 2000 screening criteria or considered insignificant for the exceedances (chlorophyll-a, dissolved oxygen, total nitrogen and total phosphorous) based on the comparison with the pre-construction baseline monitoring results and previous investigation results.
  - Although the pH measured at the downstream sampling points (WP2 and WP2-DP1) were significantly higher than the adopted ANZG 2018 / ANZECC 2000 screening criteria, it is not considered likely to be a result of the construction activities based on the discussion provided in **Section 7.4.3**.
- Upstream and downstream comparison and assessment:
  - During this construction-phase dry-weather monitoring event, the results of downstream sample point WP2, downstream discharge point (WP2-DP1) and upstream sample point WP1 were either comparable or considered insignificant / unlikely a result from the construction activities within Wiley Park worksite for the increases at downstream sample point / downstream discharge points (chlorophyll-a, total nitrogen, total phosphorous, pH and EC) based on the review of site plan, comparison with the pre-construction baseline monitoring results, previous investigation results and adopted ANZG 2018 / ANZECC 2000 criteria.

9.0 RECOMMENDATION

As discussed in **Section 7.4.3**, the elevated pH measured at WP2 and WP2-DP1 is likely caused by the significant algae growth observed at WP2-DP1 at the time of monitoring (i.e. algae can absorb dissolved CO_2 from water during photosynthesis, which causes the aquatic environmental pH to rise). However, subject to the presence / absence of the algae, site accessibility and site security, a more robust monitoring dataset consisting of field parameters (including pH and DO) measured using a data-logging meter should be obtained to confirm this.

10.0 REFERENCES

- ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the 'ANZECC Guidelines').
- ANZECC (2000). Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting (collectively known as the 'ANZECC Guidelines').
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines').
- Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
- Cardno now Stantec (2022b) *Surface Water Monitoring Report – Wiley Park Station*. Date: 15 September 2022. Revision: Rev0. Report reference: 304100142_R010_SWM_WileyPark_Rev0.
- Cardno now Stantec (2022c) *Additional pH Source Investigation within the Platform 1 Drainage System at Wiley Park Station*. Date: 9 November 2022. Revision: Rev0. Report reference: 304100142_TM02_Add_pH_Inv_P1_Rev0.
- Contaminated Land Management Act 1997.
- DECC (2008). Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction. (Volume 2D of the 'Blue Book').
- Environmental Planning and Assessment Act 1979 (EP&A Act).
- Landcom (2004). Managing Urban Stormwater: Soils and Construction. (Volume 1 of the 'Blue Book').
- Protection of the Environment Operations Act 1997 (POEO Act).
- Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades – Soil and Water Management Plan, dated 16th February 2021.
- Stantec (2023) *Validation Test of Wiley Park Station Platform 1 Drainage System 21 April 2023.* Date: 1 May 2023. Revision: RevA. Report reference: 304100142_L003_pH_P1_Val_RevA.
- The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Conditions of Approval SSI-8256, determined 12 December 2018.
- Water Management Act 2000 Water Management (General) Regulation 2018.

11.0 LIMITATIONS

This assessment has been undertaken in general accordance with the current industry standards for a surface water monitoring report for the purpose and objectives and scope identified in this report. The agreed scope of this assessment has been limited for the current purposes of the Client. The assessment may not identify contamination occurring in all areas of the site, or occurring after sampling was conducted. Subsurface conditions may vary considerably away from the sample locations where information has been obtained. This Document has been provided by Stantec subject to the following limitations:

- This Document has been prepared for the particular purpose outlined in Stantec's proposal and Section 1 of this report and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- The scope and the period of Stantec's services are as described in Stantec's proposal, and are subject to restrictions and limitations. Stantec did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Stantec in regards to it.
- Conditions may exist which were undetectable given the limited nature of the enquiry Stantec was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
- In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Stantec's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Stantec to form no more than an opinion of the actual conditions of the site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Stantec for incomplete or inaccurate data supplied by others.
- Stantec may have retained sub consultants affiliated with Stantec to provide services for the benefit of Stantec. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Stantec's affiliated companies, and their employees, officers and directors.

This assessment report is not any of the following:

- A Site Audit Report or Site Audit Statement (SAR/SAS) as defined under the Contaminated Land Management Act, 1997 or an assessment sufficient for an Environmental Auditor to be able to conclude a SAR/SAS.
- A geotechnical report and the bore logs/test pit logs may not be sufficient for geotechnical advice.
- An assessment of surface water contaminants potentially arising from other sites or sources nearby.
- A total assessment of the site to determine suitability of the entire parcel of land at the site for one or more beneficial uses of land.

Appendix A FIGURES

Surface Water Monitoring

Wiley Park Station

Project Code: 304500142
Drawn By: CZ, Checked By: CL
Figure No: 1 | Rev: 03
Date: 2023-07-20

Legend

- Monitoring Location
- Discharging Points
- Watercourse (NSW SS)
- Cadastre (NSW SS, 2022)

Notes:
1. Coordinate System: GDA2020 MGA Zone 56

References:
1. Aerial imagery supplied by MetroMap (March 2023)

Stantec

Scale at A3 1:500

m
0 5 10 15 20

Appendix B PHOTOGRAPHS

Photograph 1. Condition observed from sampling location of WP1 during the monitoring event – 15 September 2023.

Photograph 2. No stormwater in-flow observed from the discharge point WP1-DP1 that was located within the rail corridor and immediately downstream / north from WP1 during the monitoring event – 15 September 2023.

Photograph 3. Condition observed from downstream discharge point WP2-DP1 that was located within the rail corridor and immediately upstream / south from WP2 during the monitoring event. Significant algae growth was observed at this location at the time of monitoring – 15 September 2023.

Photograph 4. Condition observed from downstream discharge point WP2-DP2 that was located within the rail corridor and immediately upstream / south from WP2 during the monitoring event – 15 September 2023.

Photograph 5. Condition observed from sampling location of WP2 during the monitoring event – 15 September 2023.

Appendix C FIELD DOCUMENTS

Surface Water Sampling Field Record

Site / Project: Downer - Wiley Park	Sampling Point: WP1, WP2
Client: Downer	Job No. 304500142
Person Sampling: CC	Initials: CC

Site Details

Sampling Equipment – Directly into bottle / Water Scoop / Van Dorn Sampler / Other: Date: 15/09/2023

Observations on Site: Last Rain Event / Recent Storms / Releases / Other : Dry weather event

Sample Details, Observations, GPS Coordinates & Field Physiochemical Measurements

(if possible, record parameters once stable)

Sample ID	WP1	WP1-DP1	WP2-DP1	WP2-DP2	WP2 (QA100 QC100)
Start Time:	10:30		12:00		1:15
Easting	/		/		/
Northing	/		/		/
Sample Depth (m)	0.05		0.01		0.05
Water Body Depth (m)	0.05		0.01		0.05
Location – Onsite/Offsite /Inlet/Outlet/ Middle	Upstream		discharging point		downstream
Flow Rate None/ Low / Med / High	very low		very very low		very low
DO (mg/L)	10.15		6.16		6.46
DO (%S)	103.8		70.6		70.0
EC (µS/Cm)	496.5		622		447.9
pH	6.76		9.35		8.86
Eh (mV)	138.4		89.5		148.7
Temp (°C)	15.8		22.0		18.8
Water Colour	Clear		Clear, slightly yellow		Clear
Turbidity Low / Med / High	low		low, some dark brown suspended sediments		low
Observations / Notes	Both streams contributing	Dry / not flowing, no samples collected	see back of page for contribution calculation	not flowing, no samples collected	QA100 → primary lab QC100 → secondary lab WP2 → primary lab * see below

Sample Container & Preservation Data

Number of sample containers:	–						
Container Volume	–						
Container Type	2x 1L Amber Glass Bottle (NP) 2x 250mL oil and Grease (NP)						
Preservation	1x 500mL plastic Bottle (ND) 1x 60mL plastic Bottle (HP)						
Filtration	–						
Sample Number (for Lab ID):	–						
QA Dup Sample No.							

* Person spraying weed killer onto plants in the flow way AFTER samples were collected

Contribution of WP2-DP1 into main channel

1. Main channel
   w: 40 cm
   D: 5 cm
   F: 1

2. WP2-DP1
   w: 50 cm
   D: 0.2 cm
   F: 0.5

$$\frac{1}{2} \times 0.4 \times 0.05 \times 1 = 0.5 \times 0.002 \times 0.5$$

$$\left(\frac{0.005}{0.1}\right) = 5\%$$

Australian Government
Bureau of Meteorology

Daily rainfall

Observations of Daily rainfall are nominally made at 9 am local clock time and record the total for the previous 24 hours. Rainfall includes all forms of precipitation that reach the ground, such as rain, drizzle, hail and snow. About rainfall data

Station: Canterbury Racecourse AWS **Number:** 66194 **Opened:** 1995 **Now:** Open
Lat: 33.91° S **Lon:** 151.11° E **Elevation:** 3 m

Key: Units = mm *12.3* = Not quality controlled. ↓ = Part of accumulated total

2023	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	*0.2*	*0*	*0*	*0*		*0*	*0*	*0*	*0*			
2nd	*0*	*0*	*0.4*	*23.4*	*0*	*0*	*0*	*0*	*0*			
3rd	*0*	*0*	*0*	*20.8*	*0*	*0*	*0*	*0*	*0*			
4th	*1.0*	*0*	*3.2*	*0.4*	*0.4*	*1.0*	*2.4*	*0*	*0*			
5th	*9.6*	*0*	*0.2*	*0*	*0*	*0*	*2.2*	*0*	*0*			
6th	*2.0*	*0*	*0*	*0*	*0*	*1.8*		*9.8*	*0*			
7th	*59.0*	*0*	*0*	*0.8*	*0*	*0*	*0*	*0*	*0*			
8th	*4.4*	*0*	*0*	*8.2*	*8.8*	*0*	*0*	*4.6*	*3.2*			
9th	*0*	*37.6*	*0*	*0*	*0.2*	*0.4*	*0*	*0.2*	*2.8*			
10th	*0*	*41.2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*			
11th	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*			
12th	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*			
13th	*0*	*0.2*	*5.0*	*0.4*	*0*	*0.4*	*0*	*0*	*0*			
14th	*0.8*	*0.4*	*2.0*	*26.6*	*10.0*	*0*	*0*	*15.6*	*0*			
15th	*2.2*	*35.2*	*31.4*	*4.4*	*1.8*	*0*	*0*	*3.0*	*0*			
16th	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.6*	*0*			
17th	*0*	*0*	*0*	*0*	*4.2*	*0*	*0.8*	*0*	*0*			
18th	*0*	*0*	*0*	*0*	*0.2*	*0*	*0.2*	*7.6*				
19th	*19.8*	*5.2*	*0*	*0*	*0*	*0*	*0*	*0*				
20th	*2.6*	*0.2*	*0*		*0*	*0*	*0*	*0*				
21st	*1.4*	*0*	*2.6*		*0*	*0*	*0*	*0*				
22nd	*2.4*	*90.8*	*0*		*0*	*0*	*0*	*0*				
23rd	*40.6*	*2.8*	*0.2*		*0*	*8.0*	*0*	*2.0*				
24th	*0*	*7.4*	*4.0*		*0*	*0*	*11.6*	*1.4*				
25th	*6.8*	*0.2*	*0*		*0*	*0*	*0*	*0*				
26th	*0*	*0*	*1.4*		*0*	*0*	*0.2*	*0*				
27th	*0.6*	*0.4*	*8.8*		*0*	*0*	*0*	*0*				
28th	*0.8*	*0.4*	*0.4*		*0*	*1.0*		*0*				
29th	*0*		*3.8*		*0*	*3.0*	*0*	*0.2*				
30th	*1.6*		*0.4*		*0*	*0*	*0*	*0*				
31st	*38.2*		*0*		*0*		*0*	*8.4*				
Highest Daily	*59.0*	*90.8*	*31.4*	*26.6*	*10.0*	*8.0*	*11.6*	*15.6*	*3.2*			
Monthly Total	*194.0*	*222.0*	*63.8*			*15.6*	*17.4*	*53.4*				

Summary statistics for all years

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	82.4	127.3	115.1	98.9	75.2	98.6	65.9	61.8	49.9	67.2	72.9	63.9
Median	62.8	109.2	72.8	69.7	45.8	75.9	49.4	41.8	47.5	44.8	55.2	64.8
Highest Daily	*128.0* 31st 2001	*189.2* 10th 2020	*125.2* 8th 2022	*123.0* 21st 2015	*84.8* 14th 2003	*110.0* 5th 2016	*111.4* 3rd 2022	*121.0* 31st 1996	*70.2* 7th 2006	*121.2* 15th 2014	*64.6* 5th 2010	*67.0* 11th 2002

Data within the table which are in italics represent observations which have not been fully quality controlled, a process which may take a number of months to complete. While these data may be correct, you should exercise caution in their use. Observations of daily rainfall which span more than one day are shown in light grey, indicating that there is some uncertainty associated with the exact date on which the daily rainfall occurred.

Gaps occur in the table where a valid observation is not available. This is frequently associated with the observer being unavailable (where observations are undertaken manually), a failure in the observing equipment, or when an event has produced suspect data

Product Code: IDCJAC0009 reference: 99408092

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Appendix D LABORATORY SUMMARY TABLES

				TPH	Inorganics				Field Physio-Chemical			
			Chlorophyll a	Oil and Grease	Nitrogen (Total as N)	Phosphorus (Total as P)	TSS	Turbidity	pH - Field	Temprature	Electrical Conductivity	Dissolved Oxygen
			µg/L	mg/L	µg/L	µg/L	mg/L	NTU	Units	°C	uS/cm	%Sat
EQL			2	10	100	10	5	1	0.01	0.1	0.1	0.1
ANZECC Criteria - Freshwater			**3**	**-**	**350**	**25**	**-**	**<6-50**	**6.5-8.5**	**-**	**125-2200**	**85-110**
Lab Report Number	**Field ID**	**Date**										
1026752	**WP1**	**15/09/2023**	<2	<10	**1000**	<10	9.7	<1	6.76	15.8	496.5	103.8
1026752	**WP2**	**15/09/2023**	<2	<10	**1100**	<10	6.6	<1	**8.86**	18.8	622.0	**70.6**
1026752	**WP2-DP1**	**15/09/2023**	**4.1**	<10	**4500**	**60**	7.4	<1	**9.35**	22.0	447.9	**70**
1026752	**QA100**	**15/09/2023**	NT	<10	**1000**	<10	5.8	<1	NT	NT	NT	NT
ES2331633	**QC100**	**15/09/2023**	NT	<5	**1400**	**110**	<5	2.4	NT	NT	NT	NT
Maximum Concentration			**4.1**	<10	**4500**	**110**	9.7	2.4	**9.35**	22.0	622.0	103.8

Appendix E QUALITY ASSURANCE/QUALITY CONTRAL

Appendix E Quality Assurance/Quality Contral
July 9, 2024

Quality Assurance/Quality Control (QA/QC) procedures were implemented to ensure the precision accuracy, representativeness, completeness and comparability of all data gathered. The QA/QC procedures included:

- Equipment calibration to ensure field measurements obtained are accurate
- Equipment decontamination to prevent cross contamination
- Use of appropriate measures (i.e. gloves) to prevent cross contamination
- Appropriate sample identification
- Correct sample preservation
- Sample transport with Chain of Custody (COC) documentation
- Laboratory analysis in accordance with NATA accredited methods.

Table E1 details the QA/QC procedures and sample collection details undertaken through the surface water elements of the investigation. Copies of all the COCs, along with the Sample Receipt Notifications (SRNs), Interpretive QA/QC Reports are provided in **Appendix F**.

Table E1 Field QA/QC Method Validation

Requirement	Yes / No	Comments
Equipment decontamination	Yes	In the event of involving reusable equipment. Decontamination of sampling equipment (water quality meter, telescopic water scoop etc.) was undertaken by washing with phosphate-free detergent (Liquinox) followed by a rinse with potable water.
Sample collection	Yes	Samples were collected using disposable nitrile gloves via telescopic water scoop. A clean pair of gloves was used for each new sample being collected to limit the possibility of cross-contamination.
QA/QC sample collection	Yes	One (1) surface water duplicate and one (1) surface water triplicate sample were collected for intra- and inter-lab QA/QC purposes to monitor the quality of the field practices for sample collection. Stantec based the investigation around a rate of one duplicate and triplicate sample per sampling event, as the requirement for duplicate and triplicate sample collection.
Sample identification	Yes	All samples were marked with a unique identifier including project number, sample location, and date.
Sample preservation	Yes	Samples were placed in a chilled ice box with ice for storage and transport to the laboratory.
COC documentation	Yes	A COC form was completed by Stantec detailing sample identification, collection date, sampler and laboratory analysis required. The COC form was signed off and returned to Stantec by the laboratory staff upon receipt of all the samples. COC forms and Sample Receipt Notification (SRN) are provided in Appendix F. The SRN indicates that the samples were received at the laboratory intact and chilled and within the required holding times.
NATA accredited methods	Yes	The NATA accredited Eurofins mgt and ALS Analysed the samples in accordance with NATA accredited methods. Analytical methods used are indicated in the stamped laboratory results provided in Appendix F.
Laboratory Internal QC	Yes	All Data Quality Objectives were met by the laboratories.

Table E2 Field QA/QC Collection Summary

Environmental Media	Date	Primary	Duplicate	Triplicate
Surface Water	15/09/2023	WP2	QA100	QC100

Relative Percentage Difference Determination

Laboratory results for duplicate and triplicate samples are assessed using a determination of the Relative Percentage Difference (RPD). Where a primary sample and a duplicate sample are compared, the RPD provides an indication of the reproducibility of the results, which incorporates the sampling method. Where a primary sample and a split sample are compared, the RPD provides an indication of the accuracy of the primary laboratory results as compared to the secondary laboratory result.

The calculation used to determine the RPD is:

$$RPD = \frac{(Co - Cs)}{\left(\frac{Co + Cs}{2}\right)} x100$$

Where:

Co = Concentration of the original sample

Cs = Concentration of the duplicate sample

In calculating the RPD values the following protocols were adopted:

- Where both concentrations are above laboratory reporting limits the RPD formula is used;
- Where both concentrations are below the laboratory reporting limits, no RPD is calculated; and
- Where one or both sample concentrations are reported to be less than ten times (<10x) the laboratory reporting limit, the RPD is calculated but is not assessed against the adopted criterion.

In accordance with the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended 2013, Stantec adopts an RPD acceptance criterion up to 30% of the mean concentration of the analyte. It should be noted that variations might be higher for organic analysis, due to the volatile nature of the components, and for low concentrations of analytes.

The adopted criterion will not apply to RPDs where one of both concentrations are less than 10 times the reporting limit, as this criterion would otherwise overestimate the significance of minor variations in concentrations at or near the laboratory reporting limit. Large RPDs returned for low concentrations of analytes near the reporting limit is not as indicative of a significant difference in the results as a small RPD is for larger concentrations.

This approach is employed by NATA-accredited laboratories when assessing internal duplicate sample RPDs. This approach acknowledges that concentrations at or around the reporting limit are too low for an accurate evaluation of the significance of the RPD.

This approach has been adopted when assessing the relevance (compliance) of RPDs during this investigation. RPDs will be calculated for sample sets where one or both concentrations are less than 10 times the reporting limit for discussion purposes, but will not be assessed as a pass or fail in relation to the criterion.

The RPD results for duplicate samples are presented in this appendix. Although two (2) RPD values (turbidity) were reported to be above the accepted 30% RPD criteria (refer to the RPD table attached

below), the breaches in RPDs are not considered to alter the overall outcome of the assessment. It can be concluded that the analytical data can be relied upon for the purposes of this factual report.

Laboratory QC and QCI Report Summary

The laboratories selected for undertaking the analysis (Eurofins mgt and ALS) are NATA-accredited for the analysis required, and undertook certain QA/QC requirements to demonstrate the suitability of the data that is obtained. The laboratory is required to undertake and report internal laboratory Quality Control (QC) procedures for all chemical analysis undertaken. The QC testing is required to include:

- Laboratory duplicate sample analysis at the rate of one duplicate analysis per ten samples
- Method blank at the rate of one method blank analysis per 20 samples
- Laboratory control sample at the rate of one laboratory control sample analysis per 20 samples
- Spike recovery analysis at the rate of one spike recovery analysis per 20 samples.

Compliance with the laboratory QA/QC requirements and non-conformance details are discussed in the internal Laboratory QA/QC reports included with the certificates of analysis in **Appendix F**. Laboratory QA/QC requirements were within acceptance limits.

Stantec concludes that the data reported by the NATA-accredited Eurofins mgt and ALS as presented in this report is suitable for interpretative purposes and to make conclusions/recommendations regarding water quality.

Stantec

RPD Table

Project: Wiley Park Station
Project Number: 304500142

	Lab Report Number		1026752			1026752	ES2331633	
	Field ID		WP2	QA100		WP2	QC100	
	Matrix Type		Water	Water		Water	Water	
	Date		15 Sep 2023	15 Sep 2023	RPD	15 Sep 2023	15 Sep 2023	RPD
	Unit	EQL						
NA								
Phosphate total (as P)	MG/L	0.01	<0.01	<0.01	0	<0.01	0.11	167
Chlorophyll a	µg/L	2	<2			<2		
TPH								
Oil and Grease	mg/L	5	<10	<10	0	<10	<5	0
Inorganics								
Kjeldahl Nitrogen Total	µg/L	100	500	400	22	500	900	57
Nitrate (as N)	µg/L	20	580	590	2	580		
Nitrite (as N)	µg/L	20	40	<20	67	40		
Nitrate & Nitrite (as N)	µg/L	10	620	610	2	620	540	14
Nitrogen (Total)	µg/L	100	1,100	1,000	10	1,100	1,400	24
TSS	µg/L	5,000	6,600	5,800	13	6,600	<5,000	28
Turbidity	NTU	0.1	<1	<1	0	<1	2.4	82

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: (1 - 10 x EQL); 30 (10 - 30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

WAMSCIENTIFIC
Your water and air monitoring equipment specialists

Certificate of Service and Calibration
Water Quality Meter
YSI Professional Plus

Company Name	WAM Scientific
Office Address	26 Bungarra Crescent, Chipping Norton NSW 2170
Phone Number	+61 405 241 484
Contact Name	William Pak
Instrument	YSI Pro Plus Water Quality Meter w/ 1m Quatro Cable
Serial Number	21A102654
Client Name	Claire Corbett/Chong Zeng (Stantec Australia)
Project Number	304500142
Comments	-

Instrument Check

Item	Test	Test Passed	Comments
2 x Alkaline C-size Batteries	Klein Tools MM300 Multimeter	✓	Both batteries reading above 2.9V
Battery Saver Function	Operation	✓	Automatically turns off after 60 minutes if idle
Unit Display	Operation	✓	Screen visible, no damage
Keypad	Operation	✓	Responsive, no damage
Connection Port and Cable	Condition/Check	✓	Clean, no damage
Monitor Housing	Condition/Check	✓	No damage
Firmware	Version	✓	4.0.0
pH Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
pH millivolts for pH 7.00	Calibration	✓	pH 7.00 calibration range between 0 mV ± 50 mV
pH millivolts for pH 4.00	Calibration	✓	pH 4 mV range +165 to +180 from 7 buffer mV value
pH slope	Calibration	✓	Range between 55 to 60 mV/pH (ideal value 59 mV)
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
ORP Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
ORP Reading	Calibration	✓	Within ± 80 mV of reference Zobell Reading
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
Conductivity/Temp Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
Conductivity Cell	Calibration	✓	Conductivity cell constant 5.0 ± 1.0 in GLP file
Clean Sensor Readings	Calibration	✓	Clean sensor reads less than 3 uS/cm in dry air
Dissolved Oxygen Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
DO Cap	Condition/Calibration	✓	1.25 mil PE membrane (yellow membrane)
DO Sensor in Use	Condition	✓	Polarographic DO sensor
DO Sensor Value	Calibration	✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA

Instrument Readings

Parameter	Standard Used	Reference No.	Calibration Value	Observed	Actual	Units
Temperature	Centre 370 Thermometer	Room Temp.	15.5	15.9	15.5	°C
pH	pH 4.00	386466	4.01	4.12	4.01	pH
pH	pH 7.00	387329	7.00	7.05	7.00	pH
Conductivity	2760 µs/cm at 25°C	388521	2760	2773	2760	µs/cm
ORP (Ref. check only)	Zobell A & B	380835/382785	252.0	249.2	252.0	mV
Zero Dissolved O_2	$NaSO_3$ in Distilled H_2O	389912	0.0	0.0	0.0	%
100% Dissolved O_2	100% Air Saturated H_2O	Fresh Air	100.0	96.2	100.0	%

Declaration

WAM Scientific certifies that the above instrument was successfully tested according to manufacturer's standards and all necessary checks were conducted to ensure the instrument was fully operational prior to dispatch. The calibration data supplied was obtained in accordance with manufacturer's specifications using solutions of known values.

Calibrated By	William Pak
Calibration Date	14/09/2023
Calibration Due	14/03/2024

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Appendix F LABORATORY REPORTS

Stantec

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Contact Person:	Claire Corbett	Project Name:	Downer Sydney Metro Stations - Wiley Park
Telephone Number:	0439 088 345	Project Number:	304500142
Alternative Contact:	Chong Zheng	PO No.:	
Telephone Number:	0451 780 991	Project Specific Quote No. :	190408CDNN_1
Sampler:	CZ / CC	Turnaround Requirements:	5 Days TAT
Email Address (results and invoice):	claire.corbett@stantec.com; chong.zeng@stantec.com;	Lab:	Eurofins |
Address:	Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia	Attn:	Sample Receipt

Sample Information						Analysis Required												Comments
Cardno Sample ID	Laboratory Sample ID	No. Containers	Preservation	Date sampled	Matrix	Chlorophyll-a (LOR required - 2 ug/L)	TSS	Turbidity	Oil and Grease	Total Phosphorus	Total Nitrogen							
WP1		6	ICE	15/09/2023	Water	1	1	1	1	1	1							Please reduce the detection limit of Chlorophyll a from 5 ug/L to 2 ug/L
WP2		6	ICE		Water	1	1	1	1	1	1							
WP2-DP1		6	ICE		Water	1	1	1	1	1	1							
QA100		4	ICE		Water		1	1	1	1	1							

Relinquished by:	Chong Zeng	Received by:		Relinquished by:		Received by:	Relinquished by:
(name / company)	Stantec	(name / company)		(name / company		(name / company) Arcm	(name / company)
Date & Time:	9/15/2023	Date & Time:		Date & Time:		Date & Time: 15/9 1.50pm	Date & Time:
Signature:	CZ	Signature:		Signature:		Signature:	Signature:
Received by:		Relinquished by:		Received by:		Relinquished by:	*Lab use:*
(name / company)		(name / company)		(name / company		(name / company)	Samples Received: Cool or Ambient (circle one)
Date & Time:		Date & Time:		Date & Time:		Date & Time:	Temperature Received at: (if applicable) 10.2
Signature:		Signature:		Signature:		Signature:	Transported by: Hand delivered / courier

1026752

eurofins | Environment Testing

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NATA# 1261
Site# 25079 & 25289

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Site# 2370

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Gate Pa,
Tauranga 3112
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IANZ# 1402

Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (NSW/ACT)
Contact name:	Claire Corbett
Project name:	DOWNER SYDNEY METRO STATIONS - WILEY PARK
Project ID:	304500142
Turnaround time:	5 Day
Date/Time received	Sep 15, 2023 1:50 PM
Eurofins reference	1026752

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Hannah Mawbey on phone : or by email: HannahMawbey@eurofins.com

Results will be delivered electronically via email to Claire Corbett - claire.corbett@stantec.com.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (NSW/ACT) email address.

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West NSW 2304
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	Tel: +61 2 4968 8448
Tel: +61 3 8564 5000	Tel: +61 3 8564 5000	Tel: +61 2 9900 8400	Tel: +61 2 6113 8091	Tel: +61 7 3902 4600	NATA# 1261
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	Site# 25079 & 25289
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377
Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Christchurch	Tauranga
35 O'Rorke Road	43 Detroit Drive	1277 Cameron Road,
Penrose,	Rolleston,	Gate Pa,
Auckland 1061	Christchurch 7675	Tauranga 3112
Tel: +64 9 526 4551	Tel: +64 3 343 5201	Tel: +64 9 525 0568
IANZ# 1327	IANZ# 1290	IANZ# 1402

Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Order No.:
Report #: 1026752
Phone: (02) 9493 9700
Fax:

Received: Sep 15, 2023 1:50 PM
Due: Sep 22, 2023
Priority: 5 Day
Contact Name: Claire Corbett

Project Name: DOWNER SYDNEY METRO STATIONS - WILEY PARK
Project ID: 304500142

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Chlorophyll a	Oil & Grease (HEM)	Phosphate total (as P)	Total Suspended Solids Dried at 103 °C to 105 °C	Turbidity	Total Nitrogen Set (as N)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X				X
Sydney Laboratory - NATA # 1261 Site # 18217								X	X	X	
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	WP1	Sep 15, 2023		Water	S23-Se0038088	X	X	X	X	X	X
2	WP2	Sep 15, 2023		Water	S23-Se0038089	X	X	X	X	X	X
3	WP2-DP1	Sep 15, 2023		Water	S23-Se0038090	X	X	X	X	X	X
4	QA100	Sep 15, 2023		Water	S23-Se0038091		X	X	X	X	X
Test Counts						3	4	4	4	4	4

Stantec Australia Pty Ltd
Level 22, 570 Bourke Street
Melbourne
VIC 3000

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Claire Corbett**

Report **1026752-W**
Project name DOWNER SYDNEY METRO STATIONS - WILEY PARK
Project ID 304500142
Received Date Sep 15, 2023

Client Sample ID			**WP1**	**WP2**	**WP2-DP1**	**QA100**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S23-Se0038088**	**S23-Se0038089**	**S23-Se0038090**	**S23-Se0038091**
Date Sampled			**Sep 15, 2023**	**Sep 15, 2023**	**Sep 15, 2023**	**Sep 15, 2023**
Test/Reference	LOR	Unit				
Chlorophyll a	2	ug/L	< 2	< 2	4.1	-
Nitrate & Nitrite (as N)	0.05	mg/L	0.56	0.62	4.0	0.61
Nitrate (as N)	0.02	mg/L	0.51	0.58	4.0	0.59
Nitrite (as N)	0.02	mg/L	0.05	0.04	0.04	< 0.02
Oil & Grease (HEM)	10	mg/L	< 10	< 10	< 10	< 10
Phosphate total (as P)	0.01	mg/L	< 0.01	< 0.01	0.06	< 0.01
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.4	0.5	0.5	0.4
Total Nitrogen (as N)*	0.2	mg/L	1.0	1.1	4.5	1.0
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	9.7	6.6	7.4	5.8
Turbidity	1	NTU	< 1	< 1	< 1	< 1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chlorophyll a	Melbourne	Sep 20, 2023	28 Days
- Method: LTM-INO-4340 Chlorophyll a in Waters			
Oil & Grease (HEM)	Melbourne	Sep 19, 2023	28 Days
- Method: LTM-INO-4380 Oil and Grease (APHA 5520B)			
Phosphate total (as P)	Sydney	Sep 20, 2023	28 Days
- Method: E052 Total Phosphate (as P)			
Total Suspended Solids Dried at 103 °C to 105 °C	Sydney	Sep 20, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Turbidity	Sydney	Sep 20, 2023	2 Days
- Method: LTM-INO-4140 Turbidity by Nephelometric Method			
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	Melbourne	Sep 19, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrate (as N)	Melbourne	Sep 19, 2023	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Nitrite (as N)	Melbourne	Sep 19, 2023	2 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Total Kjeldahl Nitrogen (as N)	Melbourne	Sep 19, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West NSW 2304
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	Tel: +61 2 4968 8448
Tel: +61 3 8564 5000	Tel: +61 3 8564 5000	Tel: +61 2 9900 8400	Tel: +61 2 6113 8091	Tel: +61 7 3902 4600	NATA# 1261
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	Site# 25079 & 25289
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377
Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Christchurch	Tauranga
35 O'Rorke Road	43 Detroit Drive	1277 Cameron Road,
Penrose,	Rolleston,	Gate Pa,
Auckland 1061	Christchurch 7675	Tauranga 3112
Tel: +64 9 526 4551	Tel: +64 3 343 5201	Tel: +64 9 525 0568
IANZ# 1327	IANZ# 1290	IANZ# 1402

Company Name:	Stantec Australia Pty Ltd (NSW/ACT)	**Order No.:**		**Received:**	Sep 15, 2023 1:50 PM
Address:	Level 22, 570 Bourke Street Melbourne VIC 3000	**Report #:** **Phone:** **Fax:**	1026752 (02) 9493 9700	**Due:** **Priority:** **Contact Name:**	Sep 22, 2023 5 Day Claire Corbett
Project Name:	DOWNER SYDNEY METRO STATIONS - WILEY PARK				
Project ID:	304500142				

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Chlorophyll a	Oil & Grease (HEM)	Phosphate total (as P)	Total Suspended Solids Dried at 103 °C to 105 °C	Turbidity	Total Nitrogen Set (as N)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X				X
Sydney Laboratory - NATA # 1261 Site # 18217								X	X	X	
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	WP1	Sep 15, 2023		Water	S23-Se0038088	X	X	X	X	X	X
2	WP2	Sep 15, 2023		Water	S23-Se0038089	X	X	X	X	X	X
3	WP2-DP1	Sep 15, 2023		Water	S23-Se0038090	X	X	X	X	X	X
4	QA100	Sep 15, 2023		Water	S23-Se0038091		X	X	X	X	X
Test Counts						3	4	4	4	4	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR: RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Chlorophyll a			ug/L	< 2			2	Pass	
Oil & Grease (HEM)			mg/L	< 10			10	Pass	
Phosphate total (as P)			mg/L	< 0.01			0.01	Pass	
Total Kjeldahl Nitrogen (as N)			mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C			mg/L	< 5			5	Pass	
Turbidity			NTU	< 1			1	Pass	
LCS - % Recovery									
Oil & Grease (HEM)			%	96			70-130	Pass	
Phosphate total (as P)			%	106			70-130	Pass	
Total Kjeldahl Nitrogen (as N)			%	80			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C			%	97			70-130	Pass	
Turbidity			%	101			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	S23-Se0038772	NCP	%	80			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	W23-Se0039389	NCP	%	77			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chlorophyll a	S23-Se0038088	CP	ug/L	< 2	< 2	<1	30%	Pass	
Oil & Grease (HEM)	M23-Se0054927	NCP	mg/L	110	130	19	30%	Pass	
Phosphate total (as P)	S23-Se0038771	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	W23-Se0039390	NCP	mg/L	0.5	0.4	8.9	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Suspended Solids Dried at 103 °C to 105 °C	S23-Se0038089	CP	mg/L	6.6	7.4	11	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Turbidity	S23-Se0038091	CP	NTU	< 1	< 1	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Adam Bateup	Analytical Services Manager
Mary Makarios	Senior Analyst-Inorganic
Ryan Phillips	Senior Analyst-Inorganic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

UPDATED COC

Stantec

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Page 1 of 1

Contact Person:	Claire Corbett	Project Name:	Downer Sydney Metro Stations - Wiley Park
Telephone Number:	0438 088 345	Project Number:	304500142
Alternative Contact:	Chong Zhang	PO No.:	
Telephone Number:	0451 780 991	Project Specific Quote No. :	190408CDNN_1
Sampler:	CZ / CC	Turnarcund Requirements:	5 Days TAT
Email Address (results and invoice):	claire.corbett@stantec.com; chong.zeng@stantec.com;	Lab:	ALS	277-289 Woodpark Rd, Smithfield NSW 2164
Address: Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia		Attn:	Sample Receipt

Sample information						Analysis Required									Comments
Cardno Sample ID	Laboratory Sample ID	No. Containers	Preservation	Date sampled	Matrix		TSS	Turbidity	Oil and Grease	Total Phosphorus	Total Nitrogen			HT	
QC100		4	ICE	15/09/2023	Water		1	1	1	1	1				

Environmental Division
Sydney
Work Order Reference
ES2331633

Telephone : +61-2-8784 8555

Relinquished by:	Chong Zeng	Received by:		Relinquished by:		Received by:	Wcas ALS	Relinquished by:	
(name / company)	Stantec	(name / company)		(name / company)		(name / company)		(name / company)	
Date & Time:	15/09/2023	Date & Time:		Date & Time:		Date & Time:	15/9/23 1710	Date & Time:	
Signature:	CZ	Signature:		Signature:		Signature:		Signature:	
Received by:		Relinquished by:		Received by:		Relinquished by:		*Lab use:*	
(name / company)		(name / company)		(name / company)		(name / company)		Samples Received: Cool or Ambient (circle one)	
Date & Time:		Date & Time:		Date & Time:		Date & Time		Temperature Received at:	(if applicable)
Signature:		Signature		Signature:		Signature:		Transported by: Hand delivered / courier	

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2331633**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: claire.corbett@stantec.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Page	: 1 of 2
Order number	: ----	Quote number	: EP2022MWHAUS0030 (EN/024/)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CZ / CC		

Dates

Date Samples Received	: 15-Sep-2023 17:10	Issue Date	: 16-Sep-2023
Client Requested Due Date	: 22-Sep-2023	Scheduled Reporting Date	: **22-Sep-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 19.3'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EA045 Turbidity	WATER - EP020 Oil & Grease (O&G)	WATER - NT-11 Total Nitrogen and Total Phosphorus
ES2331633-001	15-Sep-2023 00:00	QC100	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS ADDRESS		
- A4 - AU Tax Invoice (INV)	Email	sapinvoices@stantec.com
CHONG ZENG		
- *AU Certificate of Analysis - NATA (COA)	Email	chong.zeng@cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chong.zeng@cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chong.zeng@cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chong.zeng@cardno.com.au
- Chain of Custody (CoC) (COC)	Email	chong.zeng@cardno.com.au
- EDI Format - ESDAT (ESDAT)	Email	chong.zeng@cardno.com.au
- EDI Format - XTab (XTAB)	Email	chong.zeng@cardno.com.au
CLAIRE CORBETT		
- *AU Certificate of Analysis - NATA (COA)	Email	claire.corbett@stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	claire.corbett@stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	claire.corbett@stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	claire.corbett@stantec.com
- Chain of Custody (CoC) (COC)	Email	claire.corbett@stantec.com
- EDI Format - ESDAT (ESDAT)	Email	claire.corbett@stantec.com
- EDI Format - XTab (XTAB)	Email	claire.corbett@stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **ES2331633**	Page	: 1 of 2
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 15-Sep-2023 17:10
Order number	: ----	Date Analysis Commenced	: 16-Sep-2023
C-O-C number	: ----	Issue Date	: 22-Sep-2023 10:41
Sampler	: CZ / CC		
Site	: ----		
Quote number	: EN/024/		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC100	----	----	----	----
			Sampling date / time	15-Sep-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2331633-001	--------	--------	--------	--------
				Result	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**2.4**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.54**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.9**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.4**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.11**	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **ES2331633**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 15-Sep-2023
Order number	: ----	Date Analysis Commenced	: 16-Sep-2023
C-O-C number	: ----	Issue Date	: 22-Sep-2023
Sampler	: CZ / CC		
Site	: ----		
Quote number	: EN/024/		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 5311569)									
ES2331541-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	52	51	0.0	0% - 50%
ES2331633-001	QC100	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
ES2331666-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	12	12	0.0	No Limit
ES2331796-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	8	43.1	No Limit
EA045: Turbidity (QC Lot: 5302228)									
ES2331571-001	Anonymous	EA045: Turbidity	----	0.1	NTU	4.8	5.0	4.5	0% - 20%
ES2331641-001	Anonymous	EA045: Turbidity	----	0.1	NTU	6.1	6.0	0.0	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5308603)									
ES2331649-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.94	1.97	1.7	0% - 20%
ES2331683-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	3.75	3.81	1.7	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5308601)									
ES2331614-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	394	389	1.3	0% - 20%
ES2331683-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.2	1.1	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5308602)									
ES2331614-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	41.2	41.6	1.0	0% - 20%
ES2331683-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 5311569)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	99.7	83.0	129
				<5	1000 mg/L	96.2	82.0	110
				<5	931 mg/L	105	83.0	118
EA045: Turbidity (QCLot: 5302228)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	96.5	91.0	105
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5308603)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5308601)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	99.2	69.0	101
				<0.1	1 mg/L	108	70.0	118
				<0.1	5 mg/L	102	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5308602)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	103	71.3	126
				<0.01	0.442 mg/L	110	71.3	126
				<0.01	1 mg/L	103	70.0	130
EP020: Oil and Grease (O&G) (QCLot: 5311849)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	102	81.0	121
				<5	4000 mg/L	95.0	70.0	110

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5308603)							
ES2331649-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	115	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5308601)							
ES2331633-001	QC100	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5308602)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5308602) - continued							
ES2331633-001	QC100	EK067G: Total Phosphorus as P	----	1 mg/L	103	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2331633**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 15-Sep-2023
Site	: ----	Issue Date	: 22-Sep-2023
Sampler	: CZ / CC	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
QC100	15-Sep-2023	----	----	----	21-Sep-2023	22-Sep-2023	✓
EA045: Turbidity							
Clear Plastic Bottle - Natural (EA045)							
QC100	15-Sep-2023	----	----	----	16-Sep-2023	17-Sep-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
QC100	15-Sep-2023	----	----	----	20-Sep-2023	13-Oct-2023	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
QC100	15-Sep-2023	20-Sep-2023	13-Oct-2023	✓	21-Sep-2023	13-Oct-2023	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
QC100	15-Sep-2023	20-Sep-2023	13-Oct-2023	✓	21-Sep-2023	13-Oct-2023	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
QC100	15-Sep-2023	----	----	----	21-Sep-2023	13-Oct-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	4	41	**9.76**	**8.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	5	40	**12.50**	**12.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	16	**18.75**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	11	**27.27**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	3	41	**7.32**	**6.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)

APPENDIX 3 – SURFACE WATER MONITORING REPORT WILEY PARK STATION – 6 DECEMBER 2023

Surface Water Monitoring Report - Wiley Park Station

Construction-Phase Quarterly Dry-Weather Event (6 December 2023)

9 July 2024

Prepared for:

DT Infrastructure Pty Ltd

Prepared by:

Stantec Australia Pty Ltd

Revision	Description	Author		Quality Check		Independent Review	
RevA	Draft	Chong Zeng	24/01/2024	Mike Jorgensen	24/01/2024	Clare Madigan	24/01/2024
Rev0	Final		09/07/2024		09/07/2024		09/07/2024

This document entitled Surface Water Monitoring Report - Wiley Park Station (Construction-Phase Quarterly Dry-Weather Event (6 December 2023) was prepared by Stantec Australia Pty Ltd ("Stantec") for the account of DT Infrastructure Pty Ltd (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)

Chong Zeng

Environmental Engineer

Quality Checked by _____
(signature)

Mike Jorgensen

Senior Principal Hydrogeologist

Independently Reviewed by _____
(signature)

Clare Madigan

Senior Environmental Scientist

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Abbreviations

MSB	Metro Services Building
SWMP	Soil and Water Management Plan
DO	Dissolved oxygen
EC	Electrical conductivity
pH	Potential of hydrogen
ORP	Oxidation-reduction potential
NATA	National Association of Testing Authorities, Australia
QA/QC	Quality assurance/quality control
TSS	Total Suspended Solids
CoA	Conditions of Approval
DQO	Data Quality Objective
DQIs	Data Quality Indicators
RPD	Relative Percentage Difference
LORs	limits of reporting
CoC	Chain-of-Custody

Unit

NTU	Nephelometric Turbidity Units
µS/cm	MicroSiemens per Centimeter
µg/L	Microgram per Liter

1.0 INTRODUCTION

1.1 BACKGROUND

Stantec Australia Pty Ltd ("Stantec" – formerly Cardno) was commissioned by DT Infrastructure Pty Ltd ("DTI" – formerly Downer EDI) to undertake monitoring and reporting of surface water quality of the unnamed channel near the Wiley Park Station Upgrade worksite. The proposed upgrade includes the upgrade of the main station and installation of the Metro Services Building (MSB).

Surface water quality of the channel near the Wiley Park Upgrade Site is to be monitored as per the requirements summarised in the **Table 1-2**, which is excerpted from the Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades Soil and Water Management Plan (SWMP). The monitoring program was prepared to meet the requirements outlined in The Sydney Metro City and Southwest – Sydenham to Bankstown Upgrade Conditions of Approval SSi-8256, specifically Condition 8 to Condition 10. The sampling locations (WP1 – Upstream and WP2 – Downstream) of the water quality monitoring are shown on **Figure 1** in **Appendix A**. In order to establish a more robust dataset of how the downstream discharge from the worksite affects the water quality, DTI requested two additional sampling locations at the downstream discharge points (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) of the water quality monitoring since May 2022. This additional sampling at the downstream discharge points is subject to the flow contribution at the time of each monitoring event. Refer to **Figure 1** in **Appendix A** for approximate locations of the sampling locations.

The closest Project worksite to an existing watercourse is the Wiley Park Station services building, which is located approximately 100 m from an unnamed concrete-lined channel, which forms the upper reaches of Coxs Creek and is identified as a first-order stream.

For the purpose of establishing baseline water quality data within the first-order stream at Wiley Park, water quality monitoring was intended to be undertaken for a period prior to construction of the Wiley Park services building as outlined in the Table 13 of the SWMP. At a minimum, one dry-weather sample and one wet weather sample (weather permitting) were intended to be collected during the pre-construction period. The frequency of pre-construction water quality monitoring within this channel was subject to water being present within the structure. However, during the baseline monitoring period no wet-weather event was able to be captured prior to commencement of construction. A dry-weather baseline monitoring event was undertaken on 10 March 2021.

This report presents the findings from the 18th surface water monitoring event, which was undertaken by Stantec on 6 December 2023. The event undertaken was a construction-phase quarterly dry-weather event. It is noted that although this event is considered as a construction-phase monitoring event, no work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification as suggested by DTI. **Table 1-1** below summarised the surface water monitoring events undertaken to date by Stantec.

Table 1-1 Summary of Surface Water Monitoring Event Undertaken to Date

Date of Monitoring	Type of Event	Report Reference
10 March 2021	Pre-construction Dry Baseline	4NE30187_R001_SWM_WileyPark_Rev0
20 March 2021	Construction-Phase Wet Weather	4NE30187_R001_SWM_WileyPark_Rev0
5 May 2021	Construction-Phase Wet Weather	4NE30187_R002_SWM_WileyPark_Rev0
1 July 2021	Construction-Phase Dry Weather	NE30161_R003_SWM_WileyPark_Rev0
30 September 2021	Construction-Phase Dry Weather	NE30161_R004_SWM_WileyPark_Rev0
12 November 2021	Construction-Phase Wet Weather	NE30161_R005_SWM_WileyPark_Rev0
26 November 2021	Construction-Phase Wet Weather	NE30161_R005_SWM_WileyPark_Rev0
9 and 10 February 2022	Construction-Phase Dry Weather	NE30161_R006_SWM_WileyPark_Rev0
23 February 2022	Construction-Phase Wet Weather	NE30161_R007_SWM_WileyPark_Rev0
9 March 2022	Construction-Phase Wet Weather	NE30161_R008_SWM_WileyPark_Rev0
24 May 2022	Construction-Phase Wet Weather	NE30161_R009_SWM_WileyPark_Rev0
4 and 21 July 2022	Construction-Phase Wet Weather	304100142_R010_SWM_WileyPark_Rev0
25 August 2022	Construction-Phase Dry Weather	304100142_R011_SWM_WileyPark_Rev0
25 November 2022	Construction-Phase Dry Weather	304100142_R012_SWM_WileyPark_Rev0
22 February 2023	Construction-Phase Wet Weather	304100142_R013_SWM_WileyPark_Rev0
30 June 2023	Construction-Phase Dry Weather	304500142_R014_SWM_WileyPark_Rev0
15 September 2023	Construction-Phase Dry Weather	304500142_R015_SWM_WileyPark_Rev0
6 December 2023	Construction-Phase Dry Weather	304501315_001_002_WP SWM_R16_Rev0

1.2 PURPOSE AND OBJECTIVE

The purpose of the surface water monitoring works is to monitor and record surface water quality within the unnamed channel in accordance with the monitoring program as outlined in the site's SWMP. The objective of the works is to evaluate whether construction activities are impacting water quality downstream of the project footprint in the unnamed channel. The evaluation entailed comparing water quality of samples collected upstream of the worksite discharge points with water quality downstream of the discharge points.

1.3 SCOPE OF WORKS

Stantec undertook the following tasks during the surface water monitoring event:

- Inspected and sampled the two nominated surface water sampling locations (WP1 – Upstream and WP2 – Downstream) on 6 December 2023 as a construction-phase quarterly dry-weather monitoring event.
- Inspected two additional nominated downstream discharge points locations (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) and sampled on one of the additional nominated downstream discharge point locations (WP2-DP1) on 6 December 2023 as part of construction-phase quarterly dry-weather monitoring event. No sampling work was undertaken at the downstream discharge point – WP2-DP2 due to dry condition.

- Recorded field parameters (measured using a calibrated water quality meter) and noted observations of the water bodies during sampling. Field parameters measured included:
  - Dissolved oxygen (DO).
  - Electrical conductivity (EC).
  - Potential of hydrogen (pH).
  - Oxidation-reduction potential (ORP).
  - Temperature.
- Collected three primary surface water samples from WP1, WP2 and WP2-DP1, one intra-lab duplicate sample and one inter-lab duplicate sample per sampling event for submission to a laboratory accredited by the National Association of Testing Authorities, Australia (NATA) for the requested analytical testing of primary and additional quality assurance/quality control (QA/QC) samples. Samples were submitted for analysis of:
  - Oil & Grease.
  - Total Suspended Solids (TSS).
  - Nutrients (Total Phosphorous, Total Nitrogen).
  - Turbidity.
  - Chlorophyll-a.
- Reviewed the analytical and field data and prepared this report.

Details of the monitoring program are shown below in **Table 1-2**, which is excerpted from the Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades SWMP.

Table 1-2 Wiley Park Water Quality Monitoring Program

Wiley Park Water Quality Monitoring Program	
Waterway	Sydney Water Cooks River Channel (first-order stream)
Indicative inspection and / or monitoring points	WP1 – upstream
	WP2 – downstream
	WP2-DP1- downstream eastern discharge point[1]
	WP2-DP2 – downstream western discharge point[1]
Interaction with project works	Channel near the Wiley Park service building site
Pre-construction works	Monthly for parameters detailed in Table 11 of the site's SWMP (including at least one dry-weather round of sampling). One wet-weather event, if possible, for the parameters detailed in Table 11, subject to event occurrence, safe conditions for monitoring and access being available to conduct monitoring. Note: A wet-weather event is when the receiving area has received greater than 20 mm of rain in 24 hours. The sampling was undertaken immediately during construction hours and if it is safe to do so.
During construction of the Wiley Park services building	Quarterly for parameters detailed in Table 11 of the site's SWMP (including during dry weather). Four wet-weather events per year for the parameters in Table 11, subject to event occurrence, safe conditions for monitoring and access being available to conduct monitoring. Note: A wet-weather event is when the receiving area has received greater than 20mm of rain in 24 hours. The sampling was undertaken immediately during construction hours and if it is safe to do so.

Notes to Table

1 In order to establish a more robust dataset of how the downstream discharge from the worksite affects the water quality, DTI requested two additional sampling locations at the downstream discharge points (WP2-DP1 – downstream eastern discharge point and WP2-DP2 – downstream western discharge point) of the water quality monitoring since May 2022. This additional sampling at the downstream discharge points is subject to the flow contribution at the time of each monitoring event.

2.0 GUIDELINES AND LEGISLATION

There are a range of Guidelines and Legislation and Conditions of Approval (CoA) that are applicable to the surface water monitoring program that are summarised below.

The CoA applicable to this job include:

- The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Conditions of Approval SSI-8256, determined 12 December 2018.

The State and Federal legislation and policy and guidelines that apply to the program include:

- Environmental Planning and Assessment Act 1979 (EP&A Act).
- Contaminated Land Management Act 1997.
- Protection of the Environment Operations Act 1997 (POEO Act).
- Water Management Act 2000 Water Management (General) Regulation 2018.

Additional guidelines and standards to the management of soil and water include:

- Landcom (2004). Managing Urban Stormwater: Soils and Construction. (Volume 1 of the 'Blue Book').
- DECC (2008). Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction. (Volume 2D of the 'Blue Book').
- ANZECC and ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the 'ANZECC Guidelines').
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines').

3.0 MONITORING AND INSPECTION LOCATIONS

Details of the inspection and / or monitoring locations are provided in **Table 3-1**. The approximate locations are provided in **Appendix A**. Representative photographs are presented in **Appendix B**.

Table 3-1 Surface Water Monitoring Location Details

Sample Location	Approx. Latitude	Approx. Longitude	Description
WP1 (up-stream)	-33.924014	151.065315	Immediately south of The Boulevarde and east of 118 The Boulevarde.
WP2 (down-stream)	-33.923339	151.064970	Immediately north of the Urunga Parade and west of 4 Urunga Parade.
WP2-DP1 (downstream eastern discharge point)	-33.923543	151.065058	Immediately south of Urunga Parade, east side of the channel, approximately 20 m south of WP2.
WP2-DP2 (downstream western discharge point)	-33.923529	151.065048	Immediately south of Urunga Parade, west side of the channel, approximately 20 m south / upstream of WP2.

4.0 QUALITY MANAGEMENT

The Data Quality Objective (DQO) process is used to establish a systematic planning approach to setting the type, quantity and quality of data required for making decisions based on the environmental condition of the project area. The DQO process involves the seven steps detailed in **Table 4-1**.

Table 4-1 Data Quality Objectives

DQO	Description
Step 1 State the Problem	Construction work may adversely impact the local surface water quality within the unnamed channel near the site.
Step 2 Identify the Decisions	Are there any impacts to surface water quality from construction activities at the site?
Step 3 Identify Inputs to the Decision	The primary inputs to the decisions described above are: • Assessment of surface water quality of the unnamed channel within proximity to Wiley Park service building site per the requirements outlined in the site's SWMP, with samples collected from the nominated monitoring locations (upstream and downstream of the site); • Laboratory analysis of surface water samples for relevant parameters; • Assessment of the suitability of the analytical data obtained, against the Data Quality Indicators (DQIs); • Assessment of the analytical results against applicable guideline criteria; and • Aesthetic observations of surface water bodies, including odours, sheen and condition, if encountered.
Step 4 Define the Study Boundaries	The lateral extent of the study area is the channel near the Wiley Park service building site. The temporal boundaries of the study comprises the duration of the monitoring program, including pre-construction monitoring, construction phase, and post-construction monitoring as required.
Step 5 Develop a Decision Rule	The decision rules for the water quality monitoring sampling events included: • Were primary and QA/QC samples analysed using methods endorsed by relevant regulatory guidelines at laboratories NATA-accredited for the requested analyses? • Did the field and laboratory QA/QC results indicate that the data set was reliable and representative of the water quality with Relative Percentage Difference (RPD) values of 30% or less? • Were the laboratory limits of reporting (LORs) below the applicable guideline criteria for the analysed parameters? • Were guideline criteria sourced from endorsed guidelines? • Were surface water aesthetic characteristics evaluated including odours and sheen? • Were the monitoring results obtained from the downstream sample collected during construction phase greater than the upstream sample collected during the same monitoring event? If so, then the adverse impact to the quality of water in the unnamed channel is considered to have potentially occurred.
Step 6 Specify Limits on Decision Error	In accordance with the relevant guidelines as endorsed under the Contaminated Land Management Act 1997. Specific limits for this project are in accordance with the appropriate guidance made or endorsed by state and national regulations, appropriate indicators of data quality, and standard procedures for field sampling and handling. This step also examines the certainty of conclusive statements based on the available new Site data collected. This should include the following points to quantify tolerable limits:

DQO	Description
	• A decision can be made based on a certainty assumption of 95% confidence in any given data set (excluding asbestos). A limit on the decision Type I error will be 5% (alpha) that a conclusive statement may be a false positive. Type II error rate (false negative) would be higher (typically around 20%). A decision error in the context of the decision rule presented above would lead to either underestimation or overestimation of the risk level associated with a particular sampling area. Decision errors may include: • Sampling errors may occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the Site. To address this, minimum numbers of samples are proposed to be collected from each media. As such, there may be limitations in the data if aspects of the sampling plan cannot be implemented. Some examples of this scenario include but not limited to: – Proposed samples are not collected due to lack of water flow or access being restricted to a given location. • Limitations in ability to acquire useful and representative information from the data collected. The data are proposed to be collected from multiple locations and sample media. • Measurement errors can occur during sample collection, handling, preparation, analysis and data reduction. To address this the following measures are proposed: – Field staff to follow a standard procedure when undertaking samples, including decontamination of tools, removal of adhered soil to avoid false positives in results, collection of representative samples and use of appropriate sample containers and preservation methods. – Laboratories to follow a standard procedure when preparing samples for analysis and undertaking analysis. – Laboratories to report quality assurance/ quality control data for comparison with the DQIs established for the project
Step 7 Optimise the Design for Obtaining Data	To achieve the DQOs and DQIs, the following sampling procedures were implemented to optimise the design for obtaining data: • Surface water samples was collected from upstream and downstream sampling locations, as available due to access and water level; • Surface water samples was collected from 2 discharge points between upstream and downstream, as available due to access and water level; • Surface water parameters were selected based on project monitoring requirements provided to Stantec; • Samples were collected by suitably qualified and experienced environmental scientists; • Samples were collected and preserved in accordance with relevant standards/guidelines; and • Field and laboratory QA/QC procedures were adopted and reviewed to indicate the reliability of the results obtained.

4.1 DATA QUALITY INDICATORS

The following DQIs have been adopted for the project. The DQIs outlined in **Table 4-2** assist with decisions regarding the usefulness of the data obtained, including the quality of the laboratory data.

Table 4-2 Summary of Data Quality Indicators

Data Quality Indicator	Frequency	Data Acceptance Criteria
Completeness		
Field documentation correct	All samples	The work was documented in accordance with Stantec SOPs

Data Quality Indicator	Frequency	Data Acceptance Criteria
Suitably qualified and experience sampler	All samples	Person deemed competent by Stantec collecting and logging samples
Appropriate lab methods and limits of reporting (LORs)	All samples	Samples were analysed using methods endorsed by relevant regulatory guidelines at laboratories NATA-accredited for the requested analyses.
Chain of custodies (COCs) completed appropriately	All samples	The work was documented in accordance with Stantec SOPs
Sample holding times complied with	All samples	The samples were extracted and analysed within holding times specified by the project NATA-accredited laboratory
Proposed/critical locations sampled	-	Proposed/critical locations sampled
Comparability		
Consistent standard operating procedures for collection of each sample. Samples should be collected, preserved and handled in a consistent manner	All samples	All works undertaken in accordance with Stantec SOPs
Experienced sampler	All samples	Person deemed competent by Stantec collecting and logging samples
Climatic conditions (temp, rain etc.) recorded and influence on samples quantified (if required)	All samples	Climatic conditions documented in field sheets
Consistent analytical methods, laboratories and units	All samples	Sample analysis to be in accordance with NATA-approved methods
Representativeness		
Sampling appropriate for media and analytes (appropriate collection, handling and storage)	All samples	Sample analysis to be in accordance with NATA-approved methods
Samples homogenous	All samples	All works undertaken in accordance with Stantec SOPs
Detection of laboratory artefacts, e.g. contamination blanks	-	Laboratory artefacts assessed and impact on results determined
Samples extracted and analysed within holding times	All samples	The samples were extracted and analysed within holding times specified by the laboratory
Precision		
Blind duplicates (intra-laboratory duplicates)	1 per 20 samples	Less than or equal to 30% RPD No Limit RPD result less than 10 × LOR
Split duplicates (inter-laboratory duplicates)	1 per 20 samples	Less than or equal to 30% RPD No Limit RPD result less than 10 × LOR
Laboratory duplicates	1 per 20 samples	Results greater than 10 x LOR:less than or equal to 30% RPD Results less than 10 x LOR: No limit on RPD
Accuracy (Bias)		
Surrogate spikes	All organic samples	50-150%
Matrix spikes	1 per 20 samples	70-130%

Data Quality Indicator	Frequency	Data Acceptance Criteria
Laboratory control samples	1 per 20 samples	70-130%
Method blanks	1 per 20 samples	Less than LOR

The DQOs and DQIs for the project were met during the monitoring events. Discussion of the Quality Control / Quality Assurance assessment is provided in **Appendix E**.

5.0 FIELD INVESTIGATION

The scope and method of the surface water monitoring is summarised in **Table 5-1**.

Table 5-1 Investigation Activity Summary

Activity	Details
Dates of Fieldwork	6 December 2023
Surface Water Inspection and Monitoring	All 4 nominated locations outlined in **Section 3.0** were inspected during the course of the field work undertaken on 6 December 2023 with 3 nominated locations monitored including WP1 – upstream, WP2 – downstream, WP2-DP1 – downstream eastern discharge point. No monitoring was undertaken at WP2-DP2 (downstream western discharge point) due to the dry condition at WP2-DP2 at the time of fieldwork undertaken. Stantec undertook the inspection and/or monitoring per the following procedures: Surface water body inspection - The general site condition was inspected prior to commencement of field works for signs of any site activities that may have altered the surface water contamination status or require modifications to the field or laboratory works program. Each nominated location was inspected for indicators of contamination and the presence as well as the flow of surface water. This information is recorded on the field sheets presented in **Appendix C**. Surface water sampling – Subject to the flow contribution at each nominated location during the field work undertaken, field parameters and visual/olfactory observations were recorded prior to sampling at each nominated location. Physico-chemical parameters including pH, electrical conductivity (EC), dissolved oxygen (DO), reduction-oxidation potential (redox), and temperature were measured using a calibrated water quality meter. Surface water samples were collected either directly into the sampling bottle or directly from the telescopic scoop. Once field parameters were recorded, the surface water samples were transferred to appropriately preserved sample containers provided by the laboratories. Field observations, and parameters are presented in **Appendix C**. Samples were placed in laboratory supplied containers and stored on ice in a sealed ice box (esky) while onsite and in transit to the NATA-accredited laboratories for the targeted analyses.
Surface Water Analysis	Surface water samples from the monitoring event were submitted under standard chain-of-custody (CoC) procedures to NATA-accredited Eurofins Environment Testing Australia analysis of the parameters as follows: • Oil & Grease; • Total Suspended Solids (TSS); • Nutrients (Total Phosphorous, Total Nitrogen); • Turbidity; and • Chlorophyll-a. Tabulated laboratory results are presented in **Appendix D**. The Data QA /QC program and data quality review including calibration certificates is presented in **Appendix E**. Copies of the original laboratory reports, NATA-stamped laboratory certificates, and CoC documentation are included in **Appendix F**.
Decontamination	In the event of reusable sampling or monitoring equipment (telescopic scoop, water quality meter) was used decontamination was undertaken. Decontaminated between locations using a standard bucket wash. Equipment was washed in phosphate-free detergent (Liquinox) and rinsed in laboratory supplied rinsate water.

6.0 SURFACE WATER ASSESSMENT CRITERIA

The assessment criteria for surface water analytical and field data were adopted from Table 11 of the site's SWMP. The criteria for selected parameters are provided in **Table 6-1** below. ANZECC guideline criteria are included in the table for reference.

Table 6-1 Water Quality Monitoring Parameters and Adopted Criteria at Wiley Park

Parameter	ANZECC Criteria – Freshwater[1]	Proposed Trigger Values	Proposed Actions
Temperature (°C)	>80% ile; <20% ile	Downstream results are greater than upstream results in rainfall events up to and including the significant event threshold of greater than 20 mm in 24 hours. Downstream results are greater than upstream results during dry-weather sampling.	Environment Manager (or delegate) to re-test to confirm results and undertake an inspection of the adjacent works and propose actions where required.
Dissolved Oxygen (DO)	Lower limit – 85% Upper limit -110%		
Turbidity (NTU)	6-50 NTU[2]		
Oil and grease	-		
pH	Lower limit – 6.5 Upper limit – 8.5		
Salinity (as EC)	125 – 2200 µS/cm		
Total Suspended Solids (TSS)	-		
Total Phosphorus as P	25 µg/L		
Total Nitrogen as N	350 µg/L		
Chlorophyll-a	3 µg/L		

Note to Table

1 ANZECC 2000 guideline criteria (it is noted that the current on-line guidelines (ANZG 2018) also refer to the ANZECC 2000 guidelines for these parameters) are included for reference. It is noted that for dry weather events baseline testing comparison will indicate whether this existing water quality within the channel meet ANZECC 2000 guidelines, prior to construction of the services building. For wet weather events where no baseline data is available a direct comparison to upstream and downstream results is undertaken. Sydney Metro's Principal Contractor will comply with Section 120 of the Protection of the Environment Operations Act 1997.

2

7.0 SUMMARY OF RESULTS

7.1 SUMMARY OF FIELD OBSERVATIONS

All 4 nominated monitoring locations were inspected (WP1, WP2, WP2-DP1 and WP2-DP2) on 6 December 2023. A total of 3 locations (WP1, WP2 and WP2-DP1) were able to be monitored and sampled whereas the WP2-DP2 was not able to be monitored and sampled due to the dry condition during the time of fieldwork undertaken on 6 December 2023. Photos of each nominated location are included in **Appendix B**. Field observations were summarised in **Section 7.1.1** below.

7.1.1 Construction-Phase Quarterly Dry-weather Event – 6 December 2023

- The sampling event was undertaken on 6 December 2023 during a dry-weather event with 0 mm precipitation over the last 24 hours prior to the field sampling (rainfall data was obtained from the closest Bureau of Meteorology weather station, i.e., Canterbury Racecourse AWS – BOM Station ID: 066194). Refer to **Appendix C** for a copy of the weather recordings obtained from the Bureau of Meteorology website (http://www.bom.gov.au/).
- Observation of water body:
  - WP1 (upstream of work area) contained low flowing clear water with low turbidity. No visible oil sheen was observed on the water surface. The estimated depth of the water body was 0.05 m.
    - Aquatic microorganisms with a light grey colour were observed from one of two upstream flow contributions for WP1, where the water passed through a Gross Pollutant Trap (GPT) prior to merging together with the other upstream contribution. The speciation of the aquatic microorganisms is currently unknown. The extent of the visible aquatic microorganisms persisted downstream of the confluence with the other upstream contribution. However, the inferred density of the microorganisms gradually reduced further downstream. Refer to **Appendix B** for photos.
    - Strong rotten / organic odour was noted at this location during the monitoring work.
  - WP2 (downstream of work area) contained low flowing clear water with low turbidity. No visible oil sheen was observed on the water surface. The estimated depth of the water body was 0.05 m.
    - Aquatic microorganisms noted at this location inferred to be similar to the type observed at WP1. However, the density of the microorganisms had reduced significantly with colour of the microorganisms changed from light grey to dark grey. Refer to **Appendix B** for photos.
    - Moderate to strong rotten / organic odour was noted at this location during the monitoring work.
  - WP2-DP1 (downstream eastern discharge point) contained very low flowing clear / light yellow water with low turbidity. The flow contribution from this discharge point is considered minor with estimated depth of the water body to be less than 0.005 m. Significant algae growth was observed at this discharge point.
    - No grey aquatic microorganisms were observed at and immediately upstream of WP2-DP1.
    - Similar to the last monitoring event undertaken (15 September 2023), significant algae growth was observed at and immediately upstream of WP2-DP1. Although the density of the algae growth is similar to the last monitoring event, the algae-to-water ratio was

considered higher due to less ponded water observed immediately upstream of WP2-DP1 during this round of monitoring. Refer to **Appendix B** for photos.
    - Moderate to strong rotten / organic odour was noted at this location during the monitoring work.
  - WP2-DP2 (downstream western discharge point) was dry at the time of sampling. Refer to **Appendix B** for photos.
- Additional observation:
  - One discharge point (WP1-DP1) was observed immediately downstream / north of WP1 and was dry at the time of sampling. Refer to **Appendix A** for approximate location of WP1-DP1. Refer to **Appendix B** for a detailed photo.

7.2 FIELD PARAMETERS

The parameters from each location sampled are presented in **Table 7-1**.

Table 7-1 Field Physico-chemical Parameters and Observations – 6 December 2023

Field Perimeter	WP1 (upstream)	WP1-DP1 (upstream discharge point)	WP2-DP1 (downstream eastern discharge point)	WP2-DP2 (downstream western discharge point)	WP2 (downstream)
Water Depth (m)	0.05	Dry, not monitored	<0.005	Dry, not monitored	0.05
Estimated Flow Rate	low		very low		low
Temperature (°C)	22.6		26.6		25.3
pH	7.13		10.01		8.01
Electrical Conductivity (µS/cm)	532		825		1156
Dissolved Oxygen (mg/L)	1.96		7.87		2.82
Dissolved Oxygen (%)	22.7		98.4		34.4
Oxidation-Reduction Potential (mV)	-213.8		33.0		137.8
SHE[1] Redox Potential (mV)	-3.2[2]		236.4[2]		342.8[2]
Condition	Clear Low turbidity		Clear / light yellow Low turbidity / significant algae growth observed immediately upstream of the sampling point		Clear Low turbidity

Notes to Table

1 SHE – Standard Hydrogen Electrode

2 Water quality meter utilised on the day of monitoring contains Ag/AgCl reference electrode with 3.5 M KCl filling solution. As such, SHE was calculated based on Table 1 of US EPA document: SESDPROC-113-R2, Field Measurement of Oxidation-Reduction Potential (ORP).

7.3 SURFACE WATER ANALYTICAL RESULTS

Laboratory analytical results for the surface water samples collected are presented in **Appendix D**. Copies of the original laboratory reports, NATA-stamped laboratory certificates, and Chain of Custody documentation are included in **Appendix F**.

7.3.1 Construction-Phase Dry-Weather Event – 6 December 2023

The analytical results of the monitoring event indicate that:

- Concentrations of Chlorophyll-a were reported below adopted assessment criteria and laboratory LOR (that is, less than 2 µg/L) at all sample locations with exception of WP2-DP1 detected at 2.6 µg/L;
- Concentrations of Oil and Grease were reported below laboratory LOR (10 mg/L) at all sample locations with exception of WP2-DP1 detected at 28 mg/L; and
- Concentrations of nutrients (total nitrogen and the total phosphorous) were reported:
  - Nitrogen:
    - Total nitrogen:
      - WP1: 1.6 mg/L
      - WP2: 10 mg/L
      - WP2-DP1: 2.2 mg/L
    - Total Kjeldahl Nitrogen (TKN):
      - WP1: 1.4 mg/L
      - WP2: 10 mg/L
      - WP2-DP1: 0.5 mg/L
    - Total nitrate and nitrite:
      - WP1: 0.19 mg/L
      - WP2: 0.37 mg/L
      - WP2-DP1: 1.7 mg/L
  - Total phosphorous:
    - WP1: 0.26 mg/L
    - WP2: 0.30 mg/L
    - WP2-DP1: 0.18 mg/L
- TSS were reported below the laboratory LOR (that is, less than 5 mg/L) at all sample locations with exception of one of the quality assurance samples QC100 detected at 7 mg/L.
- Turbidity was reported:
  - WP1: <1 NTU
  - WP2: 7.6 NTU
  - WP2-DP1: 10 NTU

7.3.2 Baseline Results Comparison

One sampling event during the pre-construction period (baseline event) was undertaken on 10 March 2021. This event has been used for comparison of construction-phase monitoring events under similar conditions (i.e., not triggering the wet-weather event criteria). It should be noted that the baseline water quality monitoring represents a single sampling event and may not be representative of the range of water quality within the channel prior to construction starting.

The parameters from each location sampled are presented in **Table 7-2** compared with the baseline pre-construction event undertaken on 10 March 2021. Overall, conditions are similar in the pre-construction results and the construction-phase sampling event on 6 December 2023. These baseline conditions have been taken into account in the interpretation below. It is noted that downstream

sampling points (WP2-DP1 and WP2-DP2) were only added following the baseline monitoring works. Therefore no baseline results for these sample locations are available for comparison.

Table 7-2 Comparison of current sampling results to baseline results.

Location ID	Assessment Criteria	WP1 (upstream) Baseline Results 10 March 2021	WP1 (upstream) 6 December 2023	WP2 (downstream) Baseline Results 10 March 2021	WP2 (downstream) 6 December 2023
Temperature (oC)	N/A	21.3	22.6	21.1	25.3
pH	Between 6.5 and 8.5	7.90	7.13	7.61	8.01
Electrical Conductivity (µS/cm)	Between 125 and 2,200	543	532	363	1,156
Dissolved Oxygen (%)	Between 85% and 110%	63	22.7	45.9	34.4
Oxidation-Reduction Potential (mV)	N/A	140.7	-213.8	181.0	137.8
SHE[1] Redox Potential (mV)	N/A	348.13[2]	-3.2[2]	388.43[2]	342.8[2]
Chlorophyll a (µg/L)	>3	<5	<2	<5	<2
Oil and Grease (mg/L)	Comparison	<10	<10	29	<10
Nitrogen (Total) (mg/L)	>0.35	2.5	1.6	1.68	10
Phosphorus (mg/L)	>0.025	0.34	0.26	0.12	0.30
TSS (mg/L)	N/A	<1	<5	<1	<5
Turbidity (NTU)	Between 6 and 50	2.9	<1	<1	7.6

Note to Table

1 SHE – Standard Hydrogen Electrode

2 Water quality meter utilised on the day of monitoring contains Ag/AgCl reference electrode with 3.5 M KCl filling solution. As such, SHE was calculated based on Table 1 of US EPA document: SESDPROC-113-R2, Field Measurement of Oxidation-Reduction Potential (ORP).

Highlighted cell with the bold font indicates exceedance of the adopted assessment criteria.

7.4 RESULTS DISCUSSION

7.4.1 Comparison to ANZG 2018 / ANZECC 2000 Criteria

Results for the construction-phase dry-weather event sampled on 6 December 2023 generally showed monitored parameters were within the adopted threshold criteria, with the exception of dissolved oxygen, total nitrogen, total phosphorous, turbidity and pH:

- Dissolved oxygen saturation measured at two monitoring locations (WP1 and WP2) were outside (below) the adopted criteria range and was likely caused by the growth of the grey / dark grey aquatic microorganisms observed (refer to details of the observation in **Section 7.1**). The low dissolved oxygen measured at both locations was not likely to be a result of the construction activities due to:
  - The dissolved oxygen level at WP2-DP1 (i.e., the worksite discharging point) was measured at 98.4% which was within the adopted criteria range.
- Total nitrogen measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criterion range with the analytical results of 1.6 mg/L, 10 mg/L and 2.2 mg/L for WP1, WP2 and WP2-DP1 respectively. However, the elevated level of the total nitrogen measured is not considered likely to be a result of the construction activities and is considered likely from two potential off-site sources (potential primary source: the GPT located upstream of WP1 and potential secondary source: urban run-off drainage system at Shadforth Street). Detailed reasonings are provided as following:
  - Although elevated total nitrogen was measured at the worksite discharging point (WP2-DP1), there is a distinct difference in the nitrogen composition between the samples collected from the main water channel (WP1 and WP2) and from the worksite discharge point (WP2-DP1) that indicates that there was more than one source of nitrogen.
    - WP1 and WP2: high in TKN and low in total nitrate and nitrite
    - WP2-DP1: low in TKN and high in total nitrate and nitrite
  - Potential source 1: the GPT located upstream of WP1.
    - The observation of the growth of the grey / dark grey aquatic microorganism from one of the two upstream flow contributions at WP1 via the GPT is likely to be an indicator of a potential source for the elevated nitrogen level.
  - Potential source 2: urban run-off drainage system at Shadforth Street
    - It is known that high levels of total nitrogen (i.e., an order of magnitude higher than the WP2-DP1 results) had been previously identified from this off-site flow contribution. Investigation of this off-site source and associated elevated nitrogen concentration was documented in the following report:
      - Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
  - Based on the total nitrogen level and nitrogen composition reported for the samples collected from the main channel (WP1 and WP2) and the worksite discharge point (WP2-DP1), the GPT located upstream of WP1 is considered as the potential primary source and the urban run-off drainage system at Shadforth Street is considered as the potential secondary source.

- Phosphorous measured at all three locations (WP1, WP2 and WP2-DP1) were above the adopted criteria with analytical results of 0.26 mg/L, 0.30 mg/L, and 0.18 mg/L for WP1, WP2, and WP2-DP1 respectively. However, this is not considered to be a significant issue and this is not considered likely to be a result of the construction activities based on:
  - The comparison outlined in **Section 7.3.2** indicates the phosphorous measured from WP1 and WP2 during this construction-phase dry-weather event were at a similar level to the pre-construction result.
  - No significant increase of phosphorous concentrations between WP2 (downstream) and WP1 (upstream). The marginally increase (0.04 mg/L) could result from natural variation or the precision of the laboratory equipment used for the analysis.
  - Phosphorous concentration measured at the worksite discharge point (WP2-DP1) was the lowest among all three monitoring locations.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time that this monitoring event was undertaken, which reflects that the project is in the phase of potential defect(s) identification and rectification as suggested by DTI.
- Turbidity measured at one monitoring location (WP1) was outside the adopted criteria range. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on:
  - The turbidity measured at both downstream monitoring locations (WP2 and WP2-DP1) were both within the adopted criteria range.
  - The turbidity measured at WP1 was below the detection limit (<1 NTU) and less than the floor of the adopted criteria range (6-50 NTU).
- pH measured at WP1 and WP2 was within the adopted criterion range, whereas pH measured at WP2-DP1 (10.01) was outside the adopted criterion range (i.e., 6.5 – 8.5). However, it is not considered likely to be a result of the construction activities based on the discussion provided in **Section 7.4.3**.

7.4.2 Comparison of Upstream and Downstream Results

Results between upstream and downstream samples collected during the construction-phase dry-weather event were comparable, with the exception of:

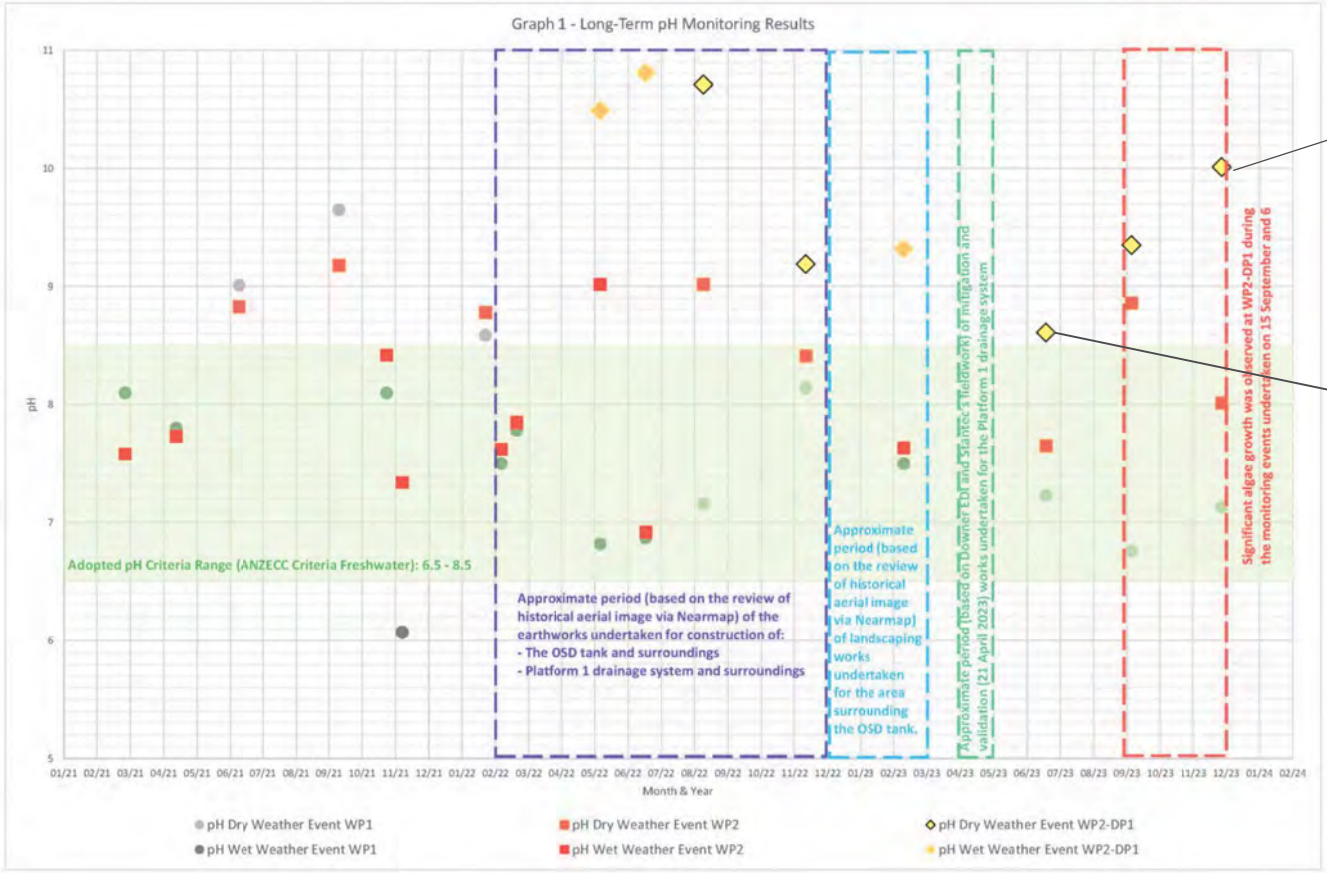
- Chlorophyll-a result at the worksite discharge point (WP2-DP1: 2.6 µg/L) was slightly higher than the upstream sampling point and downstream sampling point, which were both reported below the laboratory LOR (<2 µg /L). This detection is consistent with the field observation of significant algae growth at this discharge point. However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on:
  - Chlorophyll-a concentrations measured at both upstream monitoring location (WP1) and downstream monitoring location (WP2) were below the laboratory LOR (<2 µg /L).
  - It is known that there is an off-site flow contribution to the eastern downstream discharge point (WP2-DP1) from the urban run-off drainage system at Shadforth Street. It is known that elevated levels of nutrients (nitrogen and phosphorus) were previously identified from this off-site flow contribution. Investigation of this off-site source and associated algae growth was documented in the following report:

    - Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time that this monitoring event was undertaken, which reflects that the project is in the phase of potential defect(s) identification and rectification as suggested by DTI.
- Oil and Grease result at the worksite discharge point (WP2-DP1: 28 mg/L/L) was higher than the upstream sampling point and downstream sampling point, which were both reported below the laboratory LOR (<10 mg/L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities undertaken because:
  - Similar concentration to the Oil and Grease concentration reported for the downstream sample (WP2: 29 mg/L) collected during pre-construction baseline monitoring event undertaken on 10 March 2021.
  - No visible oil sheen was observed at this monitoring location (WP2-DP1). Refer to **Appendix B** for photos of the surface water condition at this monitoring location.
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, which reflects that the project is in the phase of potential defect(s) identification and rectification as suggested by DTI.
- Total nitrogen result at the worksite discharge point (WP2-DP1: 2.2 mg/L) and downstream sample location (WP2: 10 mg/L) were higher than the upstream sampling point (WP1: 1.6 mg/L). However, this is not considered likely to be a result of the construction activities undertaken as discussed in **Section 7.4.1**. Additionally, the total nitrogen concentration at WP1 detected significantly lower than WP2 could be caused by the incomplete mixing of the two upstream flow contributions of WP1 (i.e., sample collected at WP1 during the monitoring event could predominantly contain the water from the flow contribution not via the GPT).
- Total phosphorus result at the downstream sampling point (WP2: 0.26 mg/L) was slightly higher than the upstream sampling point (WP1: 0.30 mg/L). However, it is not considered this is a significant issue and this is not considered likely to be a result of the construction activities based on the details provided in **Section 7.4.1**.
- Turbidity results at the downstream sample location (WP2: 7.6 NTU) and the worksite discharge point (WP2-DP1: 10 NTU) were higher than the upstream sampling point (WP1: <1 NTU). However, it is not considered this is a significant issue based on:
  - Turbidity results for the two downstream monitoring locations (WP2, WP2-DP1) were measured within the ANZG 2018 / ANZECC 2000 Criteria.
- pH results at worksite discharge point (WP2-DP1: 10.01) and downstream sample point (WP2: 8.01) were higher than the results measured at the upstream sample location (WP1: 7.13). However, it is not considered likely to be a result of the construction activities based on the discussion provided in **Section 7.4.3**.
- EC result at the downstream sample location (WP2: 1,156 µS/cm) and the worksite discharge point (WP2-DP1: 825 µS/cm) was higher than the upstream sampling point (WP1: 532 µS/cm). However, it is not considered this is a significant issue based on:
  - EC results for all three sampling locations (WP1, WP2, WP2-DP1) measured were within the ANZG 2018 / ANZECC 2000 Criterion.

7.4.3 Trend Assessment – Long-Term pH Monitoring Results

Long-term pH monitoring results (total of 17 construction-phase monitoring rounds undertaken during the period from March 2021 to September 2023) were plotted in **Graph 1** below to assist the trend assessment. Key findings indicated as following:

- During the period from February 2022 to August 2022, pH exhibited a general increasing trend at WP2 and WP2-DP1. This period overlapped with the period of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings. Based on the results of the source investigations documented in the reports listed below, both construction activities were considered as the potential sources for the elevated pH measured at WP2-DP1.
  - Cardno now Stantec (2022b) *Surface Water Monitoring Report – Wiley Park Station*. Date: 15 September 2022. Revision: Rev0. Report reference: 304100142_R010_SWM_WileyPark_Rev0.
  - Cardno now Stantec (2022c) *Additional pH Source Investigation within the Platform 1 Drainage System at Wiley Park Station*. Date: 9 November 2022. Revision: Rev0. Report reference: 304100142_TM02_Add_pH_Inv_P1_Rev0.
- During the period from August 2022 to June 2023, pH exhibited a general decreasing trend at WP2 and WP2-DP1. This period overlapped with periods of:
  - The ending phase of the construction activities for the OSD tank and surroundings as well as Platform 1 drainage system and surroundings.
  - The landscaping works undertaken for the area surrounding the OSD tank.
  - The mitigation and validation work undertaken for the Platform 1 drainage system. Details of the validation assessment undertaken by Stantec has been documented in the report listed:
    - Stantec (2023) *Validation Test of Wiley Park Station Platform 1 Drainage System 21 April 2023.* Date: 1 May 2023. Revision: RevA. Report reference: 304100142_L003_pH_P1_Val_RevA.
- Similar to the pH measured from the last monitoring event undertaken on 15 September 2023, elevated pH was measured from the worksite discharge point (WP2-DP1: 10.01) during this round monitoring and is not considered likely to be a result of the construction activities undertaken because:
  - No work involving soil / ground disturbance was occurring within the Wiley Park Worksite at the time of this monitoring event undertaken, the project is in the phase of potential defect(s) identification and rectification as suggested by DTI.
  - As noted in **Section 7.1**, significant algae growth was observed at WP2-DP1 (refer to **Appendix B** for photo), which is likely to have been caused by the warmer weather along with the higher nutrient level measured. Photosynthesis associated with this significant algae growth is considered likely to have resulted in an increase in the pH measured at this location at the time of the monitoring (i.e., algae can absorb carbon dioxide dissolved in water during photosynthesis, which causes the aquatic environmental pH to rise if nitrate is the source of nitrogen).
  - The pH measured at WP2-DP1 from this round of monitoring was more than half a pH unit higher than the pH level measured at WP2-DP1 from the last monitoring event undertaken on 15 September 2023. This is likely due to the higher algae-to-water ratio in the drain immediately upstream of WP2-DP1 during this round of monitoring as noted in **Section 7.1.1**.


Graph 1 - Long-Term pH Monitoring Results
pH
Month & Year
Adopted pH Criteria Range (ANZECC Criteria Freshwater): 6.5 - 8.5
Approximate period (based on the review of historical aerial image via Nearmap) of the earthworks undertaken for construction of:
- The OSD tank and surroundings
- Platform 1 drainage system and surroundings
Approximate period (based on the review of historical aerial image via Nearmap) of landscaping works undertaken for the area surrounding the OSD tank.
Approximate period (based on Downer EDI and Stantec's fieldwork) of mitigation and validation (21 April 2023) works undertaken for the Platform 1 drainage system
Significant algae growth was observed at WP2-DP1 during the monitoring events undertaken on 15 September and 6
pH Dry Weather Event WP1
pH Dry Weather Event WP2
pH Dry Weather Event WP2-DP1
pH Wet Weather Event WP1
pH Wet Weather Event WP2
pH Wet Weather Event WP2-DP1

8.0 CONCLUSION

Stantec was engaged to undertake surface water monitoring of the unnamed channel west of Wiley Park Station in accordance with the SWMP for the project. The objective of the works was to evaluate whether construction activities are impacting water quality downstream of the project footprint in the unnamed channel that receives in part stormwater from the construction area.

This report presents monitoring data of a construction-phase dry-weather event on 6 December 2023. Based on the investigation results obtained, following conclusions are made:

- ANZG 2018 / ANZECC 2000 comparison and assessment:
  - During this construction-phase dry-weather monitoring event, monitored parameters were either within the adopted ANZG 2018 / ANZECC 2000 screening criteria or considered insignificant for the exceedances or not considered likely to be a result of the construction activities (dissolved oxygen, total nitrogen, total phosphorous, and turbidity) based on the discussion provided in **Section 7.4.1**.
  - Although the pH measured at the worksite discharge point (WP2-DP1) was significantly higher than the adopted ANZG 2018 / ANZECC 2000 screening criteria, it is not considered likely to be a result of the construction activities based on the discussion provided in **Section 7.4.3**.
- Upstream and downstream comparison and assessment:
  - During this construction-phase dry-weather monitoring event, the results of downstream sample point WP2, downstream discharge point (WP2-DP1), and upstream sample point WP1 were either comparable or considered unlikely caused by construction activities within Wiley Park worksite based on the discussion provided in **Section 7.4.2** and **Section 7.4.3**.

9.0 RECOMMENDATION

As discussed in **Section 7.4.3**, the pH spike measured during the September 2023 monitoring event is likely caused by the significant algae growth observed at WP2-DP1. However, subject to the presence / absence of the algae, site accessibility and site security, a more robust monitoring dataset consisting of field parameters (including pH and DO) could be collected using a datalogging meter to confirm this hypothesis.

10.0 REFERENCES

- ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the 'ANZECC Guidelines').
- ANZECC (2000). Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting (collectively known as the 'ANZECC Guidelines').
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines').
- Cardno now Stantec (2022a) *Source Investigation for Algal Growth Observed within the V-Drain near Shadforth Street*. Date: 2 September 2022. Revision: RevA. Report reference: 304100142_TM01_V-Drain Algal Growth_RevA.
- Cardno now Stantec (2022b) *Surface Water Monitoring Report – Wiley Park Station*. Date: 15 September 2022. Revision: Rev0. Report reference: 304100142_R010_SWM_WileyPark_Rev0.
- Cardno now Stantec (2022c) *Additional pH Source Investigation within the Platform 1 Drainage System at Wiley Park Station*. Date: 9 November 2022. Revision: Rev0. Report reference: 304100142_TM02_Add_pH_Inv_P1_Rev0.
- Contaminated Land Management Act 1997.
- DECC (2008). Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction. (Volume 2D of the 'Blue Book').
- Environmental Planning and Assessment Act 1979 (EP&A Act).
- Landcom (2004). Managing Urban Stormwater: Soils and Construction. (Volume 1 of the 'Blue Book').
- Protection of the Environment Operations Act 1997 (POEO Act).
- Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades – Soil and Water Management Plan, dated 16th February 2021.
- Stantec (2023) *Validation Test of Wiley Park Station Platform 1 Drainage System 21 April 2023.* Date: 1 May 2023. Revision: RevA. Report reference: 304100142_L003_pH_P1_Val_RevA.
- The Sydney Metro City and Southwest - Sydenham to Bankstown Upgrade Conditions of Approval SSI-8256, determined 12 December 2018.
- Water Management Act 2000 Water Management (General) Regulation 2018.

11.0 LIMITATIONS

This assessment has been undertaken in general accordance with the current industry standards for a surface water monitoring report for the purpose and objectives and scope identified in this report. The agreed scope of this assessment has been limited for the current purposes of the Client. The assessment may not identify contamination occurring in all areas of the site, or occurring after sampling was conducted. Subsurface conditions may vary considerably away from the sample locations where information has been obtained. This Document has been provided by Stantec subject to the following limitations:

- This Document has been prepared for the particular purpose outlined in Stantec's proposal and Section 1 of this report and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- The scope and the period of Stantec's services are as described in Stantec's proposal, and are subject to restrictions and limitations. Stantec did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Stantec in regards to it.
- Conditions may exist which were undetectable given the limited nature of the enquiry Stantec was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
- In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Stantec's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Stantec to form no more than an opinion of the actual conditions of the site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Stantec for incomplete or inaccurate data supplied by others.
- Stantec may have retained sub consultants affiliated with Stantec to provide services for the benefit of Stantec. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Stantec's affiliated companies, and their employees, officers and directors.

This assessment report is not any of the following:

- A Site Audit Report or Site Audit Statement (SAR/SAS) as defined under the Contaminated Land Management Act, 1997 or an assessment sufficient for an Environmental Auditor to be able to conclude a SAR/SAS.
- A geotechnical report and the bore logs/test pit logs may not be sufficient for geotechnical advice.
- An assessment of surface water contaminants potentially arising from other sites or sources nearby.
- A total assessment of the site to determine suitability of the entire parcel of land at the site for one or more beneficial uses of land.

Appendix A FIGURES

Surface Water Monitoring

Wiley Park Station

Project Code: 304501315
Drawn By: CZ, Checked By: CL
Figure No: 1 | Rev: 03
Date: 2023-07-20

Legend

- Monitoring Location
- Discharging Points
- Watercourse (NSW SS)
- Cadastre (NSW SS, 2022)

Notes:
1. Coordinate System: GDA2020 MGA Zone 56

References:
1. Aerial imagery supplied by MetroMap (March 2023)

Stantec

Scale at A3 1:500

m
0 5 10 15 20

Appendix B PHOTOGRAPHS

Photograph 1. Condition observed from the two upstream flow contributions of WP1 – 6 December 2023.

Photograph 2. Condition observed from sampling location of WP1 during the monitoring event – 6 December 2023.

Photograph 3. No stormwater in-flow observed from the discharge point WP1-DP1 that was located within the rail corridor and immediately downstream / north from WP1 during the monitoring event – 6 December 2023.

Photograph 4. Condition observed from downstream discharge point WP2-DP1 that was located within the rail corridor and immediately upstream / south from WP2 during the monitoring event. Significant algae growth was observed at this location at the time of monitoring – 6 December 2023.

Photograph 5. Condition observed from downstream discharge point WP2-DP2 that was located within the rail corridor and immediately upstream / south from WP2 during the monitoring event – 6 December 2023.

Photograph 6. Condition observed from sampling location of WP2 during the monitoring event – 6 December 2023.

Appendix C FIELD DOCUMENTS

Surface Water Sampling Field Record

Site / Project: Wiley Park SWM	**Sampling Point:**
Client: Downer	Job No. 304500142
Person Sampling: CC	Initials: CC

Site Details

Sampling Equipment – Directly into bottle / (Water Scoop) / Van Dorn Sampler / Other:	Date: 6/12/23
Observations on Site: Last Rain Event / Recent Storms / Releases / Other : Sunny	

Sample Details, Observations, GPS Coordinates & Field Physiochemical Measurements
(if possible, record parameters once stable)

Sample ID	WP1	WP1-DP1	WP2-DP1	WP2-DP2	WP2 (QA/QC 100)
Start Time:	10:00	dry - no flow	11:30	dry - no flow	
Easting	/		/		/
Northing	/		/		/
Sample Depth (m)	0.05		0.002		0.05
Water Body Depth (m)	0.05		0.002		0.05
Location – Onsite/Offsite /Inlet/Outlet/ Middle	upstream		discharge point		downstream
Flow Rate None/ Low / Med / High	Very low		Very very low		very low
DO (mg/L)	1.96 (22.7%)		7.87 (98.4 %)		2.87 (34.4%)
EC (µS/Cm)	532		825		1156
pH	7.13		10.01		8.01
Eh (mV)	-213.8		33.0		137.8
Temp (°C)	22.6		26.6		25.3
Water Colour	Clear		yellow tinge clear		Clear
Turbidity Low / Med / High	low		low		low
Observations / Notes	both streams contributing Rotten smell grey suspended sediments strong		moderate Rotten smell grey suspended sediments		strong rotten smell Black and grey suspended sediments

Sample Container & Preservation Data

Number of sample containers:	6				
Container Volume					
Container Type	2x 1L Amber Glass (CMP) 1x 500ml Plastic (ND)				
Preservation	1x Nitrogen	plastic with preservation			
Sample Number (for Lab ID):	2x 250 ml	0.1 ml	grease with preservative		
QC Dup Sample No.:					

Contribution of WP2 - DP1 into main channel

1. Main channel : W : 40 cm
D : 5 cm
F : 1

2. WP2 - DP1 : W : 50 cm
D : 0.2 cm
F : 0.5

$$\frac{1}{2} \times 0.4 \times 0.05 \times 1 = 0.5 \times 0.002 \times 0.5$$

$$\left(\frac{0.005}{0.1}\right) = 5\%$$

Notes on WP2 - DP1 : (compared to the last monitoring period)

- Flow is same / similar
- Algae in the channel up to DP is same
- Ponding water is less
- Algae is dry in places
- Algae : Water ratio has increased due to reduced cooling water

Australian Government
Bureau of Meteorology

Latest Weather Observations for Canterbury

IDN60801

Issued at 11:33 am EDT Wednesday 6 December 2023 (issued every 10 minutes, with the page automatically refreshed every 10 minutes)

Station Details **ID:** 066194 **Name:** CANTERBURY RACECOURSE AWS **Lat:** -33.91 **Lon:** 151.11 **Height:** 3.0 m

Data from the previous 72 hours. | See also: Recent months at Canterbury

Date/Time EDT	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
06/11:30am	23.6	20.7	15.1	59	5.1	SSE	24	39	13	21	-	-	0.0
06/11:00am	23.5	21.5	15.5	60	4.8	S	20	30	11	16	-	-	0.0
06/10:30am	23.5	21.1	15.5	60	4.8	S	22	33	12	18	-	-	0.0
06/10:00am	24.1	22.5	15.9	60	5.0	SSE	19	32	10	17	-	-	0.0
06/09:30am	23.5	21.1	15.5	60	4.8	SSE	22	35	12	19	-	-	0.0
06/09:00am	23.2	20.8	15.5	62	4.6	SSE	22	35	12	19	-	-	0.0
06/08:30am	22.9	19.7	15.2	62	4.6	SSE	26	43	14	23	-	-	0.0
06/08:00am	22.9	21.5	15.5	63	4.4	SSE	17	30	9	16	-	-	0.0
06/07:30am	22.4	19.3	15.5	65	4.1	SSE	26	39	14	21	-	-	0.0
06/07:00am	22.1	18.8	15.0	64	4.2	SSE	26	44	14	24	-	-	0.0
06/06:30am	21.8	19.2	14.9	65	4.1	SSE	22	39	12	21	-	-	0.0
06/06:00am	21.9	18.6	14.0	61	4.6	SSE	24	41	13	22	-	-	0.0
06/05:30am	22.3	18.7	13.1	56	5.3	SSE	24	46	13	25	-	-	0.0
06/05:00am	22.4	20.0	15.5	65	4.1	SSE	22	37	12	20	-	-	0.0
06/04:30am	22.4	21.8	18.8	80	2.3	SE	20	30	11	16	-	-	0.0
06/04:00am	22.3	21.5	19.3	83	1.9	SE	22	41	12	22	-	-	0.0
06/03:30am	22.9	22.5	19.3	80	2.3	SSE	20	39	11	21	-	-	0.0
06/03:00am	21.6	23.8	19.2	86	1.5	WNW	6	7	3	4	-	-	0.0
06/02:30am	21.6	25.1	19.5	88	1.3	CALM	0	0	0	0	-	-	0.0
06/02:00am	21.3	24.6	19.0	87	1.4	CALM	0	0	0	0	-	-	0.0
06/01:30am	21.5	24.8	19.1	86	1.5	CALM	0	0	0	0	-	-	0.0
06/01:00am	21.9	25.0	18.7	82	2.0	CALM	0	0	0	0	-	-	0.0
06/12:30am	21.8	24.7	18.2	80	2.2	CALM	0	0	0	0	-	-	0.0
06/12:00am	22.2	25.3	18.6	80	2.3	CALM	0	0	0	0	-	-	0.0

Date/Time EDT	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
05/11:30pm	23.3	26.6	19.0	77	2.7	CALM	0	0	0	0	-	-	0.0
05/11:00pm	24.1	27.0	18.3	70	3.7	CALM	0	0	0	0	-	-	0.0
05/10:30pm	24.9	27.5	17.4	63	4.7	CALM	0	0	0	0	-	-	0.0
05/10:00pm	25.5	26.8	17.2	60	5.2	ENE	6	9	3	5	-	-	0.0
05/09:30pm	25.5	26.7	16.9	59	5.3	NE	6	9	3	5	-	-	0.0
05/09:18pm	25.3	26.6	17.0	60	5.1	NE	6	11	3	6	-	-	0.0
05/09:00pm	24.8	26.8	17.0	62	4.8	ENE	2	9	1	5	-	-	0.0
05/08:49pm	24.9	26.6	17.1	62	4.8	ENE	4	9	2	5	-	-	0.0
05/08:30pm	25.0	26.6	17.0	61	5.0	E	4	9	2	5	-	-	0.0
05/08:00pm	25.9	26.8	16.7	57	5.7	ENE	7	15	4	8	-	-	0.0
05/07:30pm	26.7	27.7	16.9	55	6.1	ENE	7	13	4	7	-	-	0.0
05/07:00pm	27.6	27.9	16.9	52	6.7	ENE	11	17	6	9	-	-	0.0
05/06:30pm	27.8	27.9	16.4	50	7.1	ENE	11	19	6	10	-	-	0.0
05/06:00pm	28.4	26.9	16.7	49	7.3	ENE	20	28	11	15	-	-	0.0
05/05:30pm	29.5	28.7	17.0	47	7.9	ENE	17	24	9	13	-	-	0.0
05/05:00pm	29.7	28.6	17.2	47	7.9	ENE	19	28	10	15	-	-	0.0
05/04:30pm	29.5	28.1	17.0	47	7.9	NE	20	30	11	16	-	-	0.0
05/04:00pm	29.6	28.8	17.1	47	7.9	NE	17	28	9	15	-	-	0.0
05/03:30pm	29.8	28.5	17.3	47	7.9	NE	20	30	11	16	-	-	0.0
05/03:00pm	30.7	29.6	17.4	45	8.4	ENE	19	28	10	15	-	-	0.0
05/02:30pm	30.7	30.8	19.1	50	7.5	ENE	17	24	9	13	-	-	0.0
05/02:00pm	31.1	31.3	18.5	47	8.1	ENE	15	39	8	21	-	-	0.0
05/01:30pm	30.6	30.6	18.0	47	8.1	NE	15	22	8	12	-	-	0.0
05/01:00pm	30.9	32.1	19.9	52	7.2	NE	13	20	7	11	-	-	0.0
05/12:30pm	29.7	29.0	16.5	45	8.2	NE	15	22	8	12	-	-	0.0
05/12:00pm	29.6	29.4	16.8	46	8.0	NE	13	19	7	10	-	-	0.0
05/11:30am	29.6	28.1	14.2	39	9.3	N	15	24	8	13	-	-	0.0
05/11:00am	28.2	27.2	13.3	40	8.8	N	11	19	6	10	-	-	0.0
05/10:30am	27.4	26.6	15.1	47	7.5	NNW	13	20	7	11	-	-	0.0
05/10:00am	26.3	25.5	14.1	47	7.2	NW	11	19	6	10	-	-	0.0
05/09:30am	25.3	25.1	15.6	55	5.9	NNE	11	19	6	10	-	-	0.0
05/09:00am	23.6	23.9	15.9	62	4.7	N	9	15	5	8	-	-	0.0
05/08:30am	22.5	23.0	15.6	65	4.1	NNW	7	15	4	8	-	-	0.0
05/08:00am	21.0	21.0	15.3	70	3.4	NNW	9	15	5	8	-	-	0.0
05/07:30am	20.0	20.5	15.6	76	2.6	N	7	11	4	6	-	-	0.0
05/07:00am	18.6	19.2	15.8	84	1.7	N	7	11	4	6	-	-	0.0
05/06:30am	16.6	18.8	16.6	100	0.0	CALM	0	0	0	0	-	-	0.0
05/06:00am	15.4	17.2	15.4	100	0.0	CALM	0	0	0	0	-	-	0.0
05/05:30am	15.1	16.7	14.9	99	0.1	CALM	0	0	0	0	-	-	0.0
05/05:00am	15.4	17.1	15.2	99	0.1	CALM	0	0	0	0	-	-	0.0
05/04:30am	15.5	17.2	15.2	98	0.2	CALM	0	0	0	0	-	-	0.0
05/04:00am	15.4	17.0	14.8	96	0.3	CALM	0	0	0	0	-	-	0.0
05/03:30am	15.6	17.2	14.8	95	0.5	CALM	0	0	0	0	-	-	0.0
05/03:00am	15.7	16.8	14.7	94	0.6	N	2	6	1	3	-	-	0.0
05/02:30am	15.9	17.5	14.8	93	0.6	CALM	0	0	0	0	-	-	0.0
05/02:00am	16.0	17.4	14.4	90	0.9	CALM	0	0	0	0	-	-	0.0
05/01:30am	16.3	17.7	14.5	89	1.0	CALM	0	0	0	0	-	-	0.0
05/01:00am	16.5	17.9	14.5	88	1.1	CALM	0	0	0	0	-	-	0.0
05/12:30am	17.0	18.2	13.9	82	1.8	CALM	0	0	0	0	-	-	0.0
05/12:00am	17.8	19.0	13.9	78	2.2	CALM	0	0	0	0	-	-	0.0

Date/Time EDT	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
04/11:30pm	18.4	19.3	13.9	75	2.6	NNW	2	9	1	5	-	-	0.0
04/11:00pm	19.1	19.1	14.1	73	2.9	NNW	7	9	4	5	-	-	0.0
04/10:30pm	19.3	19.4	13.9	71	3.1	N	6	11	3	6	-	-	0.0
04/10:00pm	19.5	19.6	13.9	70	3.2	NNE	6	9	3	5	-	-	0.0
04/09:30pm	19.9	19.5	14.0	69	3.4	NE	9	19	5	10	-	-	0.0
04/09:00pm	19.9	18.6	13.8	68	3.5	ENE	13	20	7	11	-	-	0.0

Date/Time EDT	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
04/08:30pm	20.1	18.8	13.6	66	3.7	ENE	13	20	7	11	-	-	0.0
04/08:00pm	20.3	18.9	13.5	65	3.9	ENE	13	20	7	11	-	-	0.0
04/07:30pm	20.7	18.5	13.4	63	4.2	ENE	17	22	9	12	-	-	0.0
04/07:00pm	21.0	19.2	13.2	61	4.5	ENE	15	22	8	12	-	-	0.0
04/06:30pm	21.7	19.8	13.1	58	4.9	ENE	15	24	8	13	-	-	0.0
04/06:00pm	22.0	19.3	12.8	56	5.2	NE	19	30	10	16	-	-	0.0
04/05:30pm	22.7	20.5	13.2	55	5.5	NE	17	26	9	14	-	-	0.0
04/05:00pm	22.9	20.6	13.1	54	5.6	ENE	17	28	9	15	-	-	0.0
04/04:30pm	23.5	20.9	13.7	54	5.7	E	20	28	11	15	-	-	0.0
04/04:00pm	23.3	20.8	14.0	56	5.4	ESE	20	33	11	18	-	-	0.0
04/03:30pm	24.1	22.0	14.8	56	5.5	E	19	30	10	16	-	-	0.0
04/03:00pm	23.9	21.5	13.7	52	6.0	E	19	28	10	15	-	-	0.0
04/02:30pm	23.5	20.9	13.1	52	6.0	E	19	24	10	13	-	-	0.0
04/02:00pm	23.6	22.6	13.5	53	5.9	E	11	17	6	9	-	-	0.0
04/01:30pm	23.9	23.1	15.1	58	5.3	ESE	13	22	7	12	-	-	0.0
04/01:00pm	23.5	22.0	14.2	56	5.5	ESE	15	22	8	12	-	-	0.0
04/12:30pm	22.7	22.5	13.5	56	5.3	NE	7	17	4	9	-	-	0.0
04/12:00pm	22.3	21.4	14.9	63	4.4	SE	13	22	7	12	-	-	0.0
04/11:30am	22.2	21.9	14.3	61	4.6	SE	9	17	5	9	-	-	0.0
04/11:00am	22.0	22.1	14.4	62	4.5	E	7	13	4	7	-	-	0.0
04/10:30am	21.5	22.4	13.9	62	4.4	ENE	2	7	1	4	-	-	0.0
04/10:00am	21.6	22.4	14.7	65	4.1	SSE	4	9	2	5	-	-	0.0
04/09:30am	21.5	22.3	14.9	66	3.9	WSW	4	9	2	5	-	-	0.0
04/09:00am	20.3	20.3	15.3	73	3.0	WSW	9	13	5	7	-	-	0.8
04/08:30am	20.0	20.4	15.4	75	2.7	WSW	7	13	4	7	-	-	0.8
04/08:00am	19.6	20.3	15.7	78	2.3	WSW	6	9	3	5	-	-	0.8
04/07:30am	18.9	19.5	15.8	82	1.8	W	7	9	4	5	-	-	0.8
04/07:00am	18.4	19.1	16.0	86	1.4	W	7	11	4	6	-	-	0.8
04/06:30am	18.0	18.9	16.2	89	1.1	WNW	6	9	3	5	-	-	0.8
04/06:00am	17.9	18.6	16.1	89	1.1	WSW	7	9	4	5	-	-	0.8
04/05:30am	17.8	18.7	16.1	90	1.0	WSW	6	9	3	5	-	-	0.8
04/05:00am	17.7	19.8	16.2	91	0.9	CALM	0	0	0	0	-	-	0.8
04/04:30am	17.7	19.8	16.2	91	0.9	CALM	0	0	0	0	-	-	0.8
04/04:00am	17.7	18.4	16.2	91	0.9	S	7	13	4	7	-	-	0.8
04/03:30am	17.6	18.0	16.3	92	0.8	SSW	9	13	5	7	-	-	0.8
04/03:00am	17.8	19.2	16.3	91	0.9	SW	4	9	2	5	-	-	0.8
04/02:52am	17.8	18.7	16.1	90	1.0	SSW	6	9	3	5	-	-	0.8
04/02:35am	18.0	17.8	15.6	86	1.4	SSW	11	17	6	9	-	-	0.8
04/02:30am	18.6	18.6	15.3	81	1.9	S	9	17	5	9	-	-	0.4
04/02:00am	19.1	20.3	15.0	77	2.4	SW	2	6	1	3	-	-	0.4
04/01:30am	19.5	19.8	14.5	73	2.9	S	6	7	3	4	-	-	0.4
04/01:00am	19.6	19.9	15.0	75	2.7	SE	7	9	4	5	-	-	0.4
04/12:30am	19.7	19.6	14.9	74	2.8	SE	9	15	5	8	-	-	0.4
04/12:00am	19.7	20.0	14.9	74	2.8	SSE	7	13	4	7	-	-	0.4

Date/Time EDT	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
03/11:30pm	19.5	19.3	13.7	69	3.3	SE	7	13	4	7	-	-	0.4
03/11:00pm	20.0	19.3	14.4	70	3.3	SSE	11	22	6	12	-	-	0.4
03/10:30pm	20.2	19.3	14.8	71	3.2	SSE	13	22	7	12	-	-	0.4
03/10:00pm	20.2	18.3	14.3	69	3.4	SSE	17	26	9	14	-	-	0.4
03/09:30pm	20.1	19.2	14.9	72	3.0	SE	13	24	7	13	-	-	0.4
03/09:00pm	20.2	18.3	15.2	73	2.9	SE	19	30	10	16	-	-	0.4
03/08:30pm	20.1	18.3	15.5	75	2.7	SE	19	28	10	15	-	-	0.4
03/08:00pm	19.9	19.4	16.0	78	2.3	SSE	13	24	7	13	-	-	0.4
03/07:30pm	20.6	18.8	16.0	75	2.8	SE	20	33	11	18	-	-	0.0
03/07:00pm	20.6	18.0	16.8	79	2.3	SE	26	41	14	22	-	-	0.0
03/06:30pm	20.5	17.5	16.7	79	2.3	SE	28	44	15	24	-	-	0.0
03/06:01pm	21.4	18.0	15.9	71	3.3	SE	28	46	15	25	-	-	0.0
03/06:00pm	21.4	17.7	15.9	71	3.3	SE	30	46	16	25	-	-	0.0
03/05:30pm	21.8	17.6	16.1	70	3.4	SE	33	56	18	30	-	-	0.0
03/05:00pm	23.1	19.3	15.7	63	4.5	SSE	30	50	16	27	-	-	0.0
03/04:43pm	23.0	19.2	14.6	59	5.0	SSE	28	56	15	30	-	-	0.0
03/04:30pm	22.6	19.0	14.2	59	4.9	SSE	26	44	14	24	-	-	0.0
03/04:00pm	22.3	18.6	14.9	63	4.4	SSE	28	46	15	25	-	-	0.0
03/03:32pm	22.5	17.7	14.6	61	4.7	SE	33	52	18	28	-	-	0.0
03/03:30pm	22.9	18.4	15.5	63	4.4	SE	33	46	18	25	-	-	0.0
03/03:00pm	23.1	18.8	14.4	58	5.1	SE	30	43	16	23	-	-	0.0
03/02:31pm	23.3	19.8	15.4	61	4.7	SE	28	48	15	26	-	-	0.0
03/02:30pm	23.7	20.6	15.7	61	4.8	SE	26	41	14	22	-	-	0.0
03/02:00pm	23.5	20.1	15.8	62	4.6	SE	28	37	15	20	-	-	0.0
03/01:30pm	23.3	19.2	14.8	59	5.0	SE	30	41	16	22	-	-	0.0
03/01:00pm	23.5	18.9	12.2	49	6.4	SE	28	43	15	23	-	-	0.0
03/12:30pm	23.8	19.8	14.2	55	5.7	SE	28	35	15	19	-	-	0.0
03/12:00pm	24.2	21.4	15.4	58	5.3	SE	24	32	13	17	-	-	0.0

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Appendix D LABORATORY SUMMARY TABLES

Stantec

Results Table - Monitoring Event: 6 December 2023

Project Number: 304501315
Task: 001_002
Site Identification: Wiley Park Station
Report Title: Surface Water Monitoring

				TPH	Inorganics						Field Physio-Chemical			
			Chlorophyll a	Oil and Grease	Nitrogen (Total as N)	Kjeldahl Nitrogen Total	Nitrate & Nitrite (as N)	Phosphorus (Total as P)	TSS	Turbidity	pH - Field	Temprature	Electrical Conductivity	Dissolved Oxygen
			µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	NTU	Units	°C	uS/cm	%Sat
EQL			2	10	100	100	10	10	5	1	0.01	0.1	0.1	0.1
ANZECC Criteria - Freshwater			**3**	**-**	**350**	**-**	**-**	**25**	**-**	**6-50**	**6.5-8.5**	**-**	**125-2200**	**85-110**
Lab Report Number	**Field ID**	**Date**												
1051346	**WP1**	**6/12/2023**	<2	<10	**1,600**	1,400	190	**260**	<5	**<1**	7.13	22.6	532	**22.7**
1051346	**WP2**	**6/12/2023**	<2	<10	**10,000**	10,000	370	**300**	<5	7.6	8.01	25.3	1156	**34.4**
1051346	**WP2-DP1**	**6/12/2023**	2.6	**28**	**2,200**	500	1,700	**180**	<5	10	**10.01**	26.6	825	98.4
1051346	**QA100**	**6/12/2023**	NT	<10	**9,900**	9,500	400	**30**	<5	21	NT	NT	NT	NT
ES2342306	**QC100**	**6/12/2023**	NT	<5	**10,600**	10,200	400	**340**	7	4.7	NT	NT	NT	NT
Maximum Concentration			2.6	**28**	**10600**	**10200**	**1700**	**340**	7	21	**10.01**	26.6	1156	98.4

Appendix E QUALITY ASSURANCE/QUALITY CONTRAL

Appendix E Quality Assurance/Quality Contral
July 9, 2024

Quality Assurance/Quality Control (QA/QC) procedures were implemented to ensure the precision accuracy, representativeness, completeness and comparability of all data gathered. The QA/QC procedures included:

- Equipment calibration to ensure field measurements obtained are accurate
- Equipment decontamination to prevent cross contamination
- Use of appropriate measures (i.e. gloves) to prevent cross contamination
- Appropriate sample identification
- Correct sample preservation
- Sample transport with Chain of Custody (COC) documentation
- Laboratory analysis in accordance with NATA accredited methods.

Table E1 details the QA/QC procedures and sample collection details undertaken through the surface water elements of the investigation. Copies of all the COCs, along with the Sample Receipt Notifications (SRNs), Interpretive QA/QC Reports are provided in **Appendix F**.

Table E1 Field QA/QC Method Validation

Requirement	Yes / No	Comments
Equipment decontamination	Yes	In the event of involving reusable equipment. Decontamination of sampling equipment (water quality meter, telescopic water scoop etc.) was undertaken by washing with phosphate-free detergent (Liquinox) followed by a rinse with potable water.
Sample collection	Yes	Samples were collected using disposable nitrile gloves via telescopic water scoop. A clean pair of gloves was used for each new sample being collected to limit the possibility of cross-contamination.
QA/QC sample collection	Yes	One (1) surface water duplicate and one (1) surface water triplicate sample were collected for intra- and inter-lab QA/QC purposes to monitor the quality of the field practices for sample collection. Stantec based the investigation around a rate of one duplicate and triplicate sample per sampling event, as the requirement for duplicate and triplicate sample collection.
Sample identification	Yes	All samples were marked with a unique identifier including project number, sample location, and date.
Sample preservation	Yes	Samples were placed in a chilled ice box with ice for storage and transport to the laboratory.
COC documentation	Yes	A COC form was completed by Stantec detailing sample identification, collection date, sampler and laboratory analysis required. The COC form was signed off and returned to Stantec by the laboratory staff upon receipt of all the samples. COC forms and Sample Receipt Notification (SRN) are provided in Appendix F. The SRN indicates that the samples were received at the laboratory intact and chilled and within the required holding times.
NATA accredited methods	Yes	The NATA accredited Eurofins mgt and ALS Analysed the samples in accordance with NATA accredited methods. Analytical methods used are indicated in the stamped laboratory results provided in Appendix F.
Laboratory Internal QC	Yes	All Data Quality Objectives were met by the laboratories.

Table E2 Field QA/QC Collection Summary

Environmental Media	Date	Primary	Duplicate	Triplicate
Surface Water	06/12/2023	WP2	QA100	QC100

Relative Percentage Difference Determination

Laboratory results for duplicate and triplicate samples are assessed using a determination of the Relative Percentage Difference (RPD). Where a primary sample and a duplicate sample are compared, the RPD provides an indication of the reproducibility of the results, which incorporates the sampling method. Where a primary sample and a split sample are compared, the RPD provides an indication of the accuracy of the primary laboratory results as compared to the secondary laboratory result.

The calculation used to determine the RPD is:

$$RPD = \frac{(Co - Cs)}{\left(\frac{Co + Cs}{2}\right)} x100$$

Where:

Co = Concentration of the original sample

Cs = Concentration of the duplicate sample

In calculating the RPD values the following protocols were adopted:

- Where both concentrations are above laboratory reporting limits the RPD formula is used;
- Where both concentrations are below the laboratory reporting limits, no RPD is calculated; and
- Where one or both sample concentrations are reported to be less than ten times (<10x) the laboratory reporting limit, the RPD is calculated but is not assessed against the adopted criterion.

In accordance with the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended 2013, Stantec adopts an RPD acceptance criterion up to 30% of the mean concentration of the analyte. It should be noted that variations might be higher for organic analysis, due to the volatile nature of the components, and for low concentrations of analytes.

The adopted criterion will not apply to RPDs where one of both concentrations are less than 10 times the reporting limit, as this criterion would otherwise overestimate the significance of minor variations in concentrations at or near the laboratory reporting limit. Large RPDs returned for low concentrations of analytes near the reporting limit is not as indicative of a significant difference in the results as a small RPD is for larger concentrations.

This approach is employed by NATA-accredited laboratories when assessing internal duplicate sample RPDs. This approach acknowledges that concentrations at or around the reporting limit are too low for an accurate evaluation of the significance of the RPD.

This approach has been adopted when assessing the relevance (compliance) of RPDs during this investigation. RPDs will be calculated for sample sets where one or both concentrations are less than 10 times the reporting limit for discussion purposes, but will not be assessed as a pass or fail in relation to the criterion.

The RPD results for duplicate samples are presented in this appendix. Although three (3) RPD values (turbidity) were reported to be above the accepted 30% RPD criteria (refer to the RPD table attached below), the breaches in RPDs are not considered to alter the overall outcome of the assessment. It can be concluded that the analytical data can be relied upon for the purposes of this factual report.

Laboratory QC and QCI Report Summary

The laboratories selected for undertaking the analysis (Eurofins mgt and ALS) are NATA-accredited for the analysis required, and undertook certain QA/QC requirements to demonstrate the suitability of the data that is obtained. The laboratory is required to undertake and report internal laboratory Quality Control (QC) procedures for all chemical analysis undertaken. The QC testing is required to include:

- Laboratory duplicate sample analysis at the rate of one duplicate analysis per ten samples
- Method blank at the rate of one method blank analysis per 20 samples
- Laboratory control sample at the rate of one laboratory control sample analysis per 20 samples
- Spike recovery analysis at the rate of one spike recovery analysis per 20 samples.

Compliance with the laboratory QA/QC requirements and non-conformance details are discussed in the internal Laboratory QA/QC reports included with the certificates of analysis in **Appendix F**. Laboratory QA/QC requirements were within acceptance limits.

Stantec concludes that the data reported by the NATA-accredited Eurofins mgt and ALS as presented in this report is suitable for interpretative purposes and to make conclusions/recommendations regarding water quality.

Stantec

RPD Table

Proejct: Wiley Park Station
Project Number: 304501315
Task: 001_002

			Matrix Type	Water			Water		
			Lab Report Number	1051346			1051346	ES2342306	
			Field ID	WP2	QA100		WP2	QC100	
			Date	06 Dec 2023	06 Dec 2023	RPD	06 Dec 2023	06 Dec 2023	RPD
	Unit	EQL							
NA									
Phosphate total (as P)	MG/L	0.01		0.30	0.03	164	0.30	0.34	13
Chlorophyll a	µg/L	2		<2			<2		
TPH									
Oil and Grease	mg/L	5		<10	<10	0	<10	<5	0
Inorganics									
Kjeldahl Nitrogen Total	µg/L	100		10,000	9,500	5	10,000	10,200	2
Nitrate (as N)	µg/L	20		370	400	8	370		
Nitrite (as N)	µg/L	20		<20	<20	0	<20		
Nitrate & Nitrite (as N)	µg/L	10		370	400	8	370	400	8
Nitrogen (Total)	µg/L	100		10,000	9,900	1	10,000	10,600	6
TSS	µg/L	5,000		<5,000	<5,000	0	<5,000	7,000	33
Turbidity	NTU	0.1		7.6	21	94	7.6	4.7	47

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: (1 - 10 x EQL); 30 (10 - 30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

WAMSCIENTIFIC
Your water and air monitoring equipment specialists

Certificate of Service and Calibration
Water Quality Meter
YSI Professional Plus

Company Name	WAM Scientific
Office Address	26 Bungarra Crescent, Chipping Norton NSW 2170
Phone Number	+61 405 241 484
Contact Name	William Pak
Instrument	YSI Pro Plus Water Quality Meter w/ 1m Quatro Cable
Serial Number	20B122030
Client Name	Clarie Corbett (Stantec)
Project Number	304500142
Comments	-

Instrument Check

Item	Test	Test Passed	Comments
2 x Alkaline C-size Batteries	Klein Tools MM300 Multimeter	✓	Both batteries reading above 2.9V
Battery Saver Function	Operation	✓	Automatically turns off after 60 minutes if idle
Unit Display	Operation	✓	Screen visible, no damage
Keypad	Operation	✓	Responsive, no damage
Connection Port and Cable	Condition/Check	✓	Clean, no damage
Monitor Housing	Condition/Check	✓	No damage
Firmware	Version	✓	4.0.0
pH Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
pH millivolts for pH 7.00	Calibration	✓	pH 7.00 calibration range between 0 mV ± 50 mV
pH millivolts for pH 4.00	Calibration	✓	pH 4 mV range +165 to +180 from 7 buffer mV value
pH slope	Calibration	✓	Range between 55 to 60 mV/pH (ideal value 59 mV)
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
ORP Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
ORP Reading	Calibration	✓	Within ± 80 mV of reference Zobell Reading
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
Conductivity/Temp Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
Conductivity Cell	Calibration	✓	Conductivity cell constant 5.0 ± 1.0 in GLP file
Clean Sensor Readings	Calibration	✓	Clean sensor reads less than 3 uS/cm in dry air
Dissolved Oxygen Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
DO Cap	Condition/Calibration	✓	1.25 mil PE membrane (yellow membrane)
DO Sensor in Use	Condition	✓	Polarographic DO sensor
DO Sensor Value	Calibration	✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA

Instrument Readings

Parameter	Standard Used	Reference No.	Calibration Value	Observed	Actual	Units
Temperature	Centre 370 Thermometer	Room Temp.	29.1	30.6	29.1	°C
pH	pH 4.00	386466	4.01	4.05	4.01	pH
pH	pH 7.00	387329	7.00	7.05	7.00	pH
Conductivity	2760 µs/cm at 25°C	388521	2760	2623	2760	µs/cm
ORP (Ref. check only)	Zobell A & B	380835/382785	220.0	225.4	220.0	mV
Zero Dissolved O_2	$NaSO_3$ in Distilled H_2O	389912	0.0	0.2	0.0	%
100% Dissolved O_2	100% Air Saturated H_2O	Fresh Air	100.0	108.6	100.0	%

Declaration

WAM Scientific certifies that the above instrument was successfully tested according to manufacturer's standards and all necessary checks were conducted to ensure the instrument was fully operational prior to dispatch. The calibration data supplied was obtained in accordance with manufacturer's specifications using solutions of known values.

Calibrated By	William Pak
Calibration Date	05/12/2023
Calibration Due	05/06/2024

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Appendix F LABORATORY REPORTS

Stantec

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Contact Person:	Claire Corbett	Project Name:	Downer Sydney Metro Stations - Wiley Park
Telephone Number:	0439 088 345	Project Number:	304500142
Alternative Contact:	Chong Zheng	PO No.:	
Telephone Number:	0451 780 991	Project Specific Quote No. :	190408CDNN_1
Sampler:	CZ / CC	Turnaround Requirements:	5 Days TAT
Email Address (results and Invoice):	claire.corbett@stantec.com; chong.zeng@stantec.com;	Lab:	Eurofins |
Address: Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia		Attn:	Sample Receipt

Sample Information						Analysis Required												Comments
Cardno Sample ID	Laboratory Sample ID	No. Containers	Preservation	Date sampled	Matrix	Chlorophyll-a (LOR Required - 2 ug/L)	TSS	Turbidity	Oil and Grease	Total Phosphorus	Total Nitrogen							
WP1		6	ICE	6/12/2023	Water	1	1	1	1	1	1							Please reduce the detection limit of Chlorophyll a from 5 ug/L to 2 ug/L
WP2		6	ICE		Water	1	1	1	1	1	1							
WP2-DP1		6	ICE		Water	1	1	1	1	1	1							
QA100		4	ICE		Water		1	1	1	1	1							

Relinquished by:	Chong Zeng	Received by:	Elizabeth	Relinquished by:		Received by:	Relinquished by:
(name / company)	Stantec	(name / company)	Eurofins	(name / company)		(name / company)	(name / company)
Date & Time:	12/6/2023	Date & Time:	6/12 2:40 pm	Date & Time:		Date & Time:	Date & Time:
Signature:	CZ	Signature:	QWB	Signature:		Signature:	Signature:
Received by:		Relinquished by:		Received by:		Relinquished by:	*Lab use:*
(name / company)		(name / company)		(name / company)		(name / company)	Samples Received: Cool or Ambient (circle one)
Date & Time:		Date & Time:		Date & Time:		Date & Time:	Temperature Received at: 23.9 (if applicable)
Signature:		Signature:		Signature:		Signature:	Transported by: Hand delivered / courier

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www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

Eurofins ARL Pty Ltd

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Welshpool
WA 6106
+61 8 6253 4444
NATA# 2377
Site# 2370

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland	Auckland (Asb)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (NSW/ACT)
Contact name:	Claire Corbett
Project name:	DOWNER SYDNEY METRO STATIONS - WILEY PARK
Project ID:	304500142
Turnaround time:	5 Day
Date/Time received	Dec 6, 2023 2:40 PM
Eurofins reference	1051346

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Ursula Long on phone : or by email: UrsulaLong@eurofins.com

Results will be delivered electronically via email to Claire Corbett - claire.corbett@stantec.com.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (NSW/ACT) email address.

Eurofins Environment Testing Australia Pty Ltd
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NATA# 1261
Site# 18217

Canberra
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Mitchell
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NATA# 1261
Site# 25466

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IANZ# 1290

Tauranga
1277 Cameron Road,
Gate Pa,
Tauranga 3112
+64 9 525 0568
IANZ# 1402

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Order No.:
Report #: 1051346
Phone: (02) 9493 9700
Fax:

Received: Dec 6, 2023 2:40 PM
Due: Dec 13, 2023
Priority: 5 Day
Contact Name: Claire Corbett

Project Name: DOWNER SYDNEY METRO STATIONS - WILEY PARK
Project ID: 304500142

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Chlorophyll a	HOLD	Oil & Grease (HEM)	Phosphate total (as P)	Total Suspended Solids Dried at 103 °C to 105 °C	Turbidity	Total Nitrogen Set (as N)
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X				X
Sydney Laboratory - NATA # 1261 Site # 18217							X		X	X	X	
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	WP1	Dec 06, 2023		Water	S23-De0013225	X		X	X	X	X	X
2	WP2	Dec 06, 2023		Water	S23-De0013226	X		X	X	X	X	X
3	WP2-DP1	Dec 06, 2023		Water	S23-De0013227	X		X	X	X	X	X
4	QA100	Dec 06, 2023		Water	S23-De0013228			X	X	X	X	X
5	WASTE WATER	Dec 06, 2023		Water	S23-De0013229		X					
Test Counts						3	1	4	4	4	4	4

Stantec Australia Pty Ltd
Level 22, 570 Bourke Street
Melbourne
VIC 3000

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Claire Corbett**

Report **1051346-W**
Project name DOWNER SYDNEY METRO STATIONS - WILEY PARK
Project ID 304500142
Received Date Dec 06, 2023

Client Sample ID			**WP1**	**WP2**	**WP2-DP1**	**QA100**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**S23-De0013225**	**S23-De0013226**	**S23-De0013227**	**S23-De0013228**
Date Sampled			**Dec 06, 2023**	**Dec 06, 2023**	**Dec 06, 2023**	**Dec 06, 2023**
Test/Reference	LOR	Unit				
Chlorophyll a	2	ug/L	< 2	< 2	2.6	-
Nitrate & Nitrite (as N)	0.05	mg/L	0.19	0.37	1.7	0.40
Nitrate (as N)	0.02	mg/L	0.19	0.37	1.7	0.40
Nitrite (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Oil & Grease (HEM)	10	mg/L	< 10	< 10	28	< 10
Phosphate total (as P)	0.01	mg/L	0.26	0.30	0.18	0.03
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.4	10	0.5	9.5
Total Nitrogen (as N)*	0.2	mg/L	1.6	10	2.2	9.9
Total Suspended Solids Dried at 103 °C to 105 °C	5	mg/L	< 5	< 5	< 5	< 5
Turbidity	1	NTU	< 1	7.6	10	21

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chlorophyll a	Melbourne	Dec 13, 2023	28 Days
- Method: LTM-INO-4340 Chlorophyll a in Waters			
Oil & Grease (HEM)	Melbourne	Dec 12, 2023	28 Days
- Method: LTM-INO-4380 Oil and Grease (APHA 5520B)			
Phosphate total (as P)	Sydney	Dec 11, 2023	28 Days
- Method: E052 Total Phosphate (as P)			
Total Suspended Solids Dried at 103 °C to 105 °C	Sydney	Dec 11, 2023	7 Days
- Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry			
Turbidity	Sydney	Dec 11, 2023	2 Days
- Method: LTM-INO-4140 Turbidity by Nephelometric Method			
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrate (as N)	Melbourne	Dec 08, 2023	28 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Nitrite (as N)	Melbourne	Dec 08, 2023	2 Days
- Method: LTM-INO-4450 Determination of Nitrogen Species by Discrete Analyser			
Total Kjeldahl Nitrogen (as N)	Melbourne	Dec 08, 2023	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			

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Eurofins Environment Testing Australia Pty Ltd
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NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
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Order No.:
Report #: 1051346
Phone: (02) 9493 9700
Fax:

Received: Dec 6, 2023 2:40 PM
Due: Dec 13, 2023
Priority: 5 Day
Contact Name: Claire Corbett

Project Name: DOWNER SYDNEY METRO STATIONS - WILEY PARK
Project ID: 304500142

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						Chlorophyll a	HOLD	Oil & Grease (HEM)	Phosphate total (as P)	Total Suspended Solids Dried at 103 °C to 105 °C	Turbidity	Total Nitrogen Set (as N)
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X				X
Sydney Laboratory - NATA # 1261 Site # 18217							X		X	X	X	
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	WP1	Dec 06, 2023		Water	S23-De0013225	X		X	X	X	X	X
2	WP2	Dec 06, 2023		Water	S23-De0013226	X		X	X	X	X	X
3	WP2-DP1	Dec 06, 2023		Water	S23-De0013227	X		X	X	X	X	X
4	QA100	Dec 06, 2023		Water	S23-De0013228			X	X	X	X	X
5	WASTE WATER	Dec 06, 2023		Water	S23-De0013229		X					
Test Counts						3	1	4	4	4	4	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry weight basis unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion unless otherwise stated.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with blue colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is 7 days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ppm: parts per million
µg/L: micrograms per litre
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit
Colour: Pt-Co Units

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 70 – 130%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Nitrite (as N)	mg/L	< 0.02			0.02	Pass	
Oil & Grease (HEM)	mg/L	< 10			10	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	mg/L	< 5			5	Pass	
Turbidity	NTU	< 1			1	Pass	
LCS - % Recovery							
Nitrate & Nitrite (as N)	%	106			70-130	Pass	
Nitrite (as N)	%	86			70-130	Pass	
Oil & Grease (HEM)	%	82			70-130	Pass	
Phosphate total (as P)	%	99			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	93			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	%	99			70-130	Pass	
Turbidity	%	93			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
				Result 1					
Phosphate total (as P)	N23-De0010822	NCP	%	97			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	B23-De0014921	NCP	%	91			70-130	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	S23-De0014283	NCP	%	106			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Nitrate & Nitrite (as N)	M23-De0016572	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Nitrite (as N)	M23-De0016572	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Phosphate total (as P)	S23-De0013225	CP	mg/L	0.26	0.26	<1	30%	Pass	
Total Kjeldahl Nitrogen (as N)	B23-De0015267	NCP	mg/L	3.4	3.1	10	30%	Pass	
Total Suspended Solids Dried at 103 °C to 105 °C	S23-De0014283	NCP	mg/L	83	81	2.4	30%	Pass	
Turbidity	S23-De0013225	CP	NTU	< 1	< 1	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Ursula Long	Analytical Services Manager
Dilani Samarakoon	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Inorganic
Ryan Phillips	Senior Analyst-Inorganic

Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Stantec

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Page 1 of 1

Contact Person:	Claire Corbett	Project Name:	Downer Sydney Metro Stations - Wiley Park
Telephone Number:	0439 088 345	Project Number:	304500142
Alternative Contact:	Chong Zheng	PO No.:	
Telephone Number:	0451 780 991	Project Specific Quote No. :	190408CDNN_1
Sampler:	CZ / CC	Turnaround Requirements:	5 Days TAT
Email Address (results and invoice):	claire.corbett@stantec.com; chong.zeng@stantec.com;	Lab:	ALS	277-289 Woodpark Rd, Smithfield NSW 2164
Address: Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia		Attn:	Sample Receipt

Sample information						Analysis Required												Comments
Cardno Sample ID	Laboratory Sample ID	No. Containers	Preservation	Date sampled	Matrix		TSS	Turbidity	Oil and Grease	Total Phosphorus	Total Nitrogen				HT			
QC100		4	ICE	6/12/2023	Water		1	1	1	1	1							

Environmental Division
Sydney
Work Order Reference
ES2342306

Telephone : + 61-2-8784 8555

Relinquished by: (name / company)	Chong Zeng Stantec	Received by: (name / company)		Relinquished by: (name / company)		Received by: (name / company)	Ivcas / ALS	Relinquished by: (name / company)	
Date & Time:	6/12/2023	Date & Time:		Date & Time:		Date & Time:	6/12/23 1420	Date & Time:	
Signature:	CZ	Signature:		Signature:		Signature:		Signature:	
Received by: (name / company)		Relinquished by: (name / company)		Received by: (name / company)		Relinquished by: (name / company)		*Lab use:* Samples Received: Cool or Ambient (circle one)	
Date & Time:		Date & Time:		Date & Time:		Date & Time:		Temperature Received at:	(if applicable)
Signature:		Signature:		Signature:		Signature:		Transported by: Hand delivered / courier	

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES2342306**		
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: claire.corbett@stantec.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Page	: 1 of 2
Order number	: ----	Quote number	: EP2023MWHAUS0014 (EN/000)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CZ / CC		

Dates

Date Samples Received	: 06-Dec-2023 14:20	Issue Date	: 06-Dec-2023
Client Requested Due Date	: 13-Dec-2023	Scheduled Reporting Date	: **13-Dec-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 20.1'C, 18.7'C, 17.6'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EA045 Turbidity	WATER - EP020 Oil & Grease (O&G)	WATER - NT-11 Total Nitrogen and Total Phosphorus
ES2342306-001	06-Dec-2023 00:00	QC100	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS ADDRESS

- A4 - AU Tax Invoice (INV)	Email	sapinvoices@stantec.com

CHONG ZENG

- *AU Certificate of Analysis - NATA (COA)	Email	chong.zeng@cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	chong.zeng@cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	chong.zeng@cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	chong.zeng@cardno.com.au
- A4 - AU Tax Invoice (INV)	Email	chong.zeng@cardno.com.au
- Chain of Custody (CoC) (COC)	Email	chong.zeng@cardno.com.au
- EDI Format - ESDAT (ESDAT)	Email	chong.zeng@cardno.com.au

CLAIRE CORBETT

- *AU Certificate of Analysis - NATA (COA)	Email	claire.corbett@stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	claire.corbett@stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	claire.corbett@stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	claire.corbett@stantec.com
- A4 - AU Tax Invoice (INV)	Email	claire.corbett@stantec.com
- Chain of Custody (CoC) (COC)	Email	claire.corbett@stantec.com
- EDI Format - ESDAT (ESDAT)	Email	claire.corbett@stantec.com

CERTIFICATE OF ANALYSIS

Work Order	: **ES2342306**	Page	: 1 of 2
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 06-Dec-2023 14:20
Order number	: ----	Date Analysis Commenced	: 07-Dec-2023
C-O-C number	: ----	Issue Date	: 13-Dec-2023 14:25
Sampler	: CZ / CC		
Site	: ----		
Quote number	: EN/000		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC100	----	----	----	----
			Sampling date / time	06-Dec-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2342306-001	--------	--------	--------	--------
				Result	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**7**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**4.7**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.40**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**10.2**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**10.6**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.34**	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **ES2342306**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Contact	: Customer Services ES
Address	: Level 9 - The Forum, 203 Pacific Highway St Leonards 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 06-Dec-2023
Order number	: ----	Date Analysis Commenced	: 07-Dec-2023
C-O-C number	: ----	Issue Date	: 13-Dec-2023
Sampler	: CZ / CC		
Site	: ----		
Quote number	: EN/000		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 5483379)									
ES2342242-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	42	40	4.3	No Limit
ES2342801-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	180	182	1.1	0% - 20%
EA045: Turbidity (QC Lot: 5476592)									
ES2341949-012	Anonymous	EA045: Turbidity	----	0.1	NTU	3.8	3.7	0.0	0% - 20%
ES2342326-004	Anonymous	EA045: Turbidity	----	0.1	NTU	<0.1	<0.1	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 5481047)									
ES2342282-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.04	2.03	0.5	0% - 20%
ES2341986-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01 (1.00)*	mg/L	70.3	64.2	9.0	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 5481050)									
ES2341986-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1 (5.0)*	mg/L	35.3	35.0	1.0	No Limit
ES2342282-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.5	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 5481051)									
ES2341986-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01 (0.50)*	mg/L	6.92	7.04	1.8	0% - 50%
ES2342282-005	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.48	0.49	2.7	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 5483379)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	96.0	83.0	129
				<5	1000 mg/L	91.2	82.0	110
				<5	841 mg/L	95.9	83.0	118
EA045: Turbidity (QCLot: 5476592)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	104	91.0	105
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5481047)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5481050)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.5	69.0	101
				<0.1	1 mg/L	91.0	70.0	118
				<0.1	5 mg/L	96.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5481051)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	100	71.3	126
				<0.01	0.442 mg/L	95.2	71.3	126
				<0.01	1 mg/L	100	70.0	130
EP020: Oil and Grease (O&G) (QCLot: 5485120)								
EP020: Oil & Grease	----	5	mg/L	<5	5000 mg/L	105	81.0	121
				<5	4000 mg/L	73.1	70.0	110

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 5481047)							
ES2341986-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 5481050)							
ES2342038-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	91.0	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 5481051)							
ES2342038-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	98.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2342306**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CLAIRE CORBETT	Telephone	: +61-2-8784 8555
Project	: 304500142 Downer Sydney Metro Stations - Wiley Park	Date Samples Received	: 06-Dec-2023
Site	: ----	Issue Date	: 13-Dec-2023
Sampler	: CZ / CC	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete An	ES2341986--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	***Date analysed***	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
QC100	**06-Dec-2023**	----	----	----	**11-Dec-2023**	13-Dec-2023	✓
EA045: Turbidity							
Clear Plastic Bottle - Natural (EA045)							
QC100	**06-Dec-2023**	----	----	----	**07-Dec-2023**	08-Dec-2023	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
QC100	**06-Dec-2023**	----	----	----	**09-Dec-2023**	03-Jan-2024	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
QC100	**06-Dec-2023**	**09-Dec-2023**	03-Jan-2024	✓	**09-Dec-2023**	03-Jan-2024	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
QC100	**06-Dec-2023**	**09-Dec-2023**	03-Jan-2024	✓	**09-Dec-2023**	03-Jan-2024	✓
EP020: Oil and Grease (O&G)							
Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)							
QC100	**06-Dec-2023**	----	----	----	**12-Dec-2023**	03-Jan-2024	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	4	50	**8.00**	**8.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	5	20	**25.00**	**12.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	19	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	19	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Oil and Grease	EP020	3	50	**6.00**	**6.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Oil and Grease	EP020	WATER	In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)

APPENDIX 4 – VALIDATION TEST OF WILEY PARK STATION PLATFORM 1 DRAINAGE SYSTEM 21 APRIL 2023

Stantec Australia
Level 9, The Forum, 203 Pacific
Highway St Leonards New South
Wales 2065 Australia

Date: 25 September 2024
File: 304100142_L003_pH_P1_Val_Rev0

Attention: Geraldine Figueira
Gate 99, Bridge Road
Belmore New South Wales 2192

Dear Geraldine,

Reference: Validation Test of Wiley Park Station Platform 1 Drainage System 21 April 2023

1 INTRODUCTION

1.1 BACKGROUND

Stantec Australia Pty Ltd ("Stantec") was engaged by DT Infrastructure (DTI, formerly recognised as Downer EDI Works Pty Ltd) to monitor surface water discharging from a stormwater drain system that DTI has been constructing within Platform 1 of Wiley Park Station. Stantec's monitoring identified stormwater discharging from the site with elevated pH (up to 9.8), which is above the 6.5 to 8.5 range set out in the ANZG 2018 guidelines.

Stantec identified soil eroded from an exposed slope at the northeastern end of Platform 1 that had accumulated in the drainpipes as the source of the elevated pH in stormwater flowing through the drainpipes. Stantec recommended cleaning out the soil from the drainage system. DTI cleaned out the drainage system to the extent practicable. Stantec then undertook validation testing of the drainage system as outlined in Section 4 of Stantec (2022) to assess the effectiveness of the mitigation measures undertaken by DTI.

- *Additional pH Source Investigation within the Platform 1 Drainage System at Wiley Park Station*. Dated: 9 November 2022. Report reference: 304100142_TM02_Add_pH_Inv_P1_Rev0. Revision: 0. Prepared by Stantec (Stantec 2022).

1.2 PURPOSE AND OBJECTIVE

The purpose of this validation testing is to assess the effectiveness of the mitigation measures undertaken by DTI within the Platform 1 drainage system as per Section 4 of Stantec (2022).

1.3 SCOPE OF WORK

Stantec undertook the following scope of work to meet the purpose of this validation test:

- Reviewed details regarding the validation test to be carried out at Platform 1 drainage system in Section 4 of Stantec (2022).
- Undertook fieldwork including the following:
  - Site walkover inspection:
    - Inspected current condition of the Platform 1 drainage system to the extent feasible.
    - Inspected current condition of the surrounding areas that potentially form part of the catchment area to the Platform 1 drainage system.
  - Platform 1 drainage system validation test:

  - DTI assisted with removal of selected grates from the platform drainage system, which was constructed using aco drains, to allow sampling and testing.
  - Undertook a bump test of the water quality meter using the pH calibration solutions provided prior to the validation test (pH 4 and pH 7).
  - Checked the pH of the tap water prior to pouring water into the aco drain using a calibrated water quality meter.
  - Poured the tap water from the eastern end (upstream) of the aco drain for at least 5 mins prior to sampling.
  - Measured the pH using a calibrated water quality meter at multiple downstream locations along the aco drain and associated drainage system to confirm the effectiveness of the mitigation works undertaken.
- Prepared this report detailing the findings and conclusions based on the review and assessment of this validation test.

2 VALIDATION RESULTS AND DISCUSSION

2.1 SITE WALKOVER INSPECTION

Site walkover inspection was undertaken on 21 April 2023 prior to the validation test with a focus on the current condition of the platform 1 drainage system and the current condition of the surrounding areas that potentially form part of the catchment area to the Platform 1 drainage system. Based on the inspection undertaken, key findings indicated as following:

- Inspection of the northeast end of Platform 1 noted that a retaining wall had been constructed, which contained the likely source soil that had eroded and transported into the aco drain. Based on the inspection, it is considered that there is very low likelihood of the soil materials from the surrounding catchment area would be eroded and transported into the aco drain. Refer to **Photo 4** and **Photo 5** in **Attachment B** regarding the general current condition of the Platform 1.
- The identified alkaline soil / sediment material within the aco drain was removed to the extent practicable by DTI in accordance with Section 4 of Stantec (2022). Refer to **Photo 1** and **Photo 2** in **Attachment B** regarding the condition of the aco drain prior to the sediment removal and refer to **Photo 3** in **Attachment B** regarding the condition of the aco drain after the sediment removal.
- DTI was unable to provide access to the two drainage pits located between the downstream (south-western) end of the aco drain and the downstream discharge headwall for inspection.

2.2 VALIDATION TEST RESULTS

Due to the lack of rainfall during this site investigation (refer to **Attachment D** for a copy of nearest BOM station rainfall recording for 21 April 2023), tap water was applied to the aco drain for this validation testing. An on-site calibrated water quality meter was used to measure the site tap water and the introduced tap water at multiple downstream locations along the aco drain and associated drainage system to confirm the effectiveness of the mitigation works undertaken. It is noted that a bump test was also undertaken prior to the validation test in addition to the standard supplier calibration.

Table 2-1 below summarises the pH measurements undertaken. Refer to **Figure GS-011** in **Attachment A** for approximate monitoring locations. Refer to **Attachment C** for a copy of the certificate of calibration undertaken by the supplier for the water quality meter used.

Table 2-1 Summary of pH Validation Test Result – Platform 1 Drainage System

Sample ID	pH Measurement
Bump Test	
Bump Test with Standard pH Solution 4	4.0
Bump Test with Standard pH Solution 7	7.0
Baseline Value – Tap Water	
Tap Water pH	6.7
Aco Drain	
Val1	7.4
Val2	7.1
Val3	7.2
Val4	7.2
Val5	7.3
Val6	7.3
Val7	7.3
Val8	7.4
Val9	7.4
Val10	7.4
Discharge Point of Platform 1 Drainage System	
Val11-Headwall	7.9

2.2.1 Limitations of Testing

Due to the current site constraints and the weather condition on the day, following access and test limitations are noted:

- DTI was unable to provide the access for the two drainage pits located between the downstream (south-western) end of the aco drain and the downstream discharge headwall for inspection and validation test. Refer to **Photo 6** in **Attachment B**.
- Due to lack of rainfall and impracticality of applying tap water directly to the garden bed, no validation testing was undertaken of seepage from the garden bed that is located at the northeastern end of the Platform 1 drainage system. Refer to **Photo 7** and **Photo 8** in **Attachment B.**
- Due to lack of rainfall and impracticality of applying tap water directly to the station roof, no validation testing was undertaken of water collected by the roof / downpipe system that is located at the north-eastern end of the Platform 1 drainage system. Refer to **Photo 8** in **Attachment B.**

3 CONCLUSION

Based on the results from the inspection and validation testing as well as the limitations detailed in **Section 2.2.1**, the following conclusions are made:

- The alkaline soil / sediment material that had been previously identified within the aco drain has been adequately removed and pH measured during the validation testing ranged between 7.1 and 7.4,

which is within the applicable assessment criteria range (i.e., 6.5 – 8.5) per the site's Soil and Water Management Plan.
- pH measured at the discharge point of Platform 1 drainage system (i.e., Val11-Headwall: pH 7.9) was within the applicable assessment criteria range (i.e., 6.5 to 8.5). However, the increase of the pH measurements observed between location Val10 (pH 7.4) and Val11-Headwall (pH 7.9) suggests that the alkaline soil / sediment material noted during previous site inspections may have not been removed completely within the two inaccessible drainage pits.
- Due to lack of rainfall and impracticality of applying tap water directly to the garden bed and station roof, pH levels of the water discharged at these two locations are currently unknown.

4 RECOMMENDATIONS

Based on the findings from this investigation, the following recommendation is made:

- Subject to feasibility, the two drainage pits located near the downstream end of aco drain (refer to **Photo 6** in **Attachment B**) should be opened, checked and any soil / sediment materials should be removed by excavation.

5 LIMITATIONS

This Document has been prepared in general accordance with the current industry standards for the purpose and objectives and scope identified in this Document. These standards are set out in:

- NEPC (1999) National Environment Protection (Assessment of Site Contamination) Measure (NEPM). National Environment Protection Council (NEPC) 1999, Amendment 2013
- NEPC (2013) Schedule B(2) Guideline on Site Characterisation, NEPM 1999, Amendment 2013
- NSW EPA (2016) Environmental Guidelines: Solid Waste Landfills, Second edition. April 2016
- NSW EPA (2020) Guidelines for the Assessment and Management of Hazardous Ground Gases. New South Wales Environment Protection Authority. May 2020
- NSW EPA (2017) Guidelines for the NSW Auditor Scheme (3rd edition), New South Wales Environment Protection Authority, October 2017
- NSW EPA (2020) *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines*. New South Wales Environment Protection Authority, April 2020, Updated May 2020.

The agreed scope of this Document has been limited for the current purposes of the Client. Subsurface conditions may vary considerably away from the sample locations where information has been obtained.

This Document has been provided by Stantec subject to the following limitations:

- This Document has been prepared for the particular purpose outlined in Stantec's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- The scope and the period of Stantec's services are as described in Stantec's proposal, and are subject to restrictions and limitations. Stantec did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Stantec in regards to it.
- Conditions may exist which were undetectable given the limited nature of the enquiry Stantec was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been

revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

- In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Stantec's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Stantec to form no more than an opinion of the actual conditions of the site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Stantec for incomplete or inaccurate data supplied by others.
- Stantec may have retained sub consultants affiliated with Stantec to provide services for the benefit of Stantec. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Stantec's affiliated companies, and their employees, officers and directors.

This Document is not any of the following:

- A Site Audit Report or Site Audit Statement as defined under the *Contaminated Land Management Act, 1997*.
- A geotechnical report and the bore logs or test pit logs may not be sufficient as the basis for geotechnical advice.
- A detailed hydrogeological assessment in conformance with NSW DEC (2007) Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination.
- An assessment of groundwater contaminants potentially arising from other sites or sources nearby.
- A total assessment of the site to determine suitability of the entire parcel of land at the site for one or more beneficial uses of land.

Regards,

Stantec Australia Pty Ltd

Chong Zeng
Senior Environmental Engineer

Mike Jorgensen
Senior Principal Hydrogeologist

Attachments:

Attachment A	Figures
Attachment B	Photos
Attachment C	Calibration Certificate
Attachment D	Weather Data

Attachment A Figures

Downer
Relationships creating success

Platform 1 Aco Drain pH Validation Test

WILEY PARK NSW

FIGURE GS-011

Legend

Cadastre (NSW SS, 2022)

Monitoring Location

- pH Measurement: Tap Water
- pH Measurement: Water

N

1:400 Scale at A3

m

0 2.5 5 10 15 20

Stantec

Map Produced by Stantec Australia Pty Ltd (3045)
Date: 2023-04-27
Coordinate System: GDA 1994 MGA Zone 56
Project: 304500142.001.020
Map: NE30161-GS-011-WP-Platform1_pH_VAL.mxd 01
Aerial imagery supplied by Metromap (March 2023)

Attachment B Photos

Photo 1. Aco drain condition prior to the sediment removal on 5 October 2022.

Photo 2. Aco drain condition prior to the sediment removal on 17 March 2023.

Photo 3. Aco drain condition after the sediment removal on 21 April 2023.

Photo 4. General current condition of Platform 1, Wiley Park Station. Date: 21 April 2023.

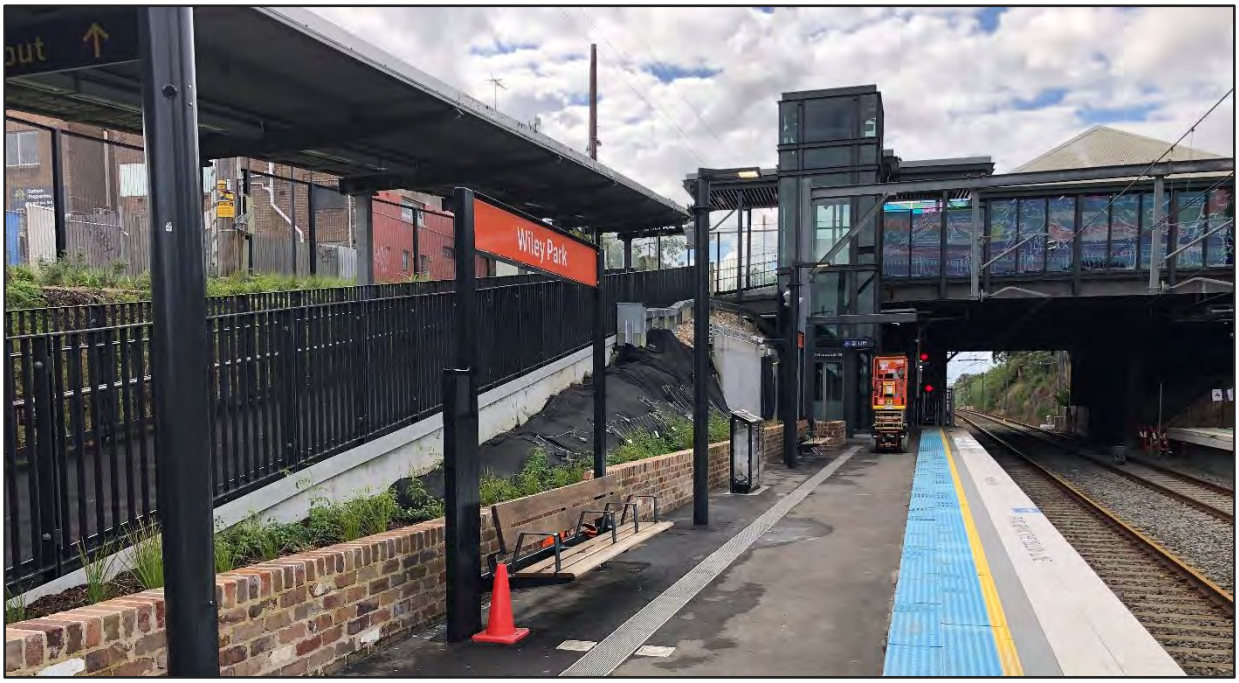

Photo 5. General current condition of Platform 1, Wiley Park Station. Date: 21 April 2023.

Photo 6. No access was obtained for the two drainage pits located between the downstream (south-western) end of the aco drain and the downstream discharge headwall for inspection and validation test. Date: 5 October 2022.

Photo 7. Garden bed located around the north-eastern end of the Platform 1 drainage system. Date: 21 April 2023.

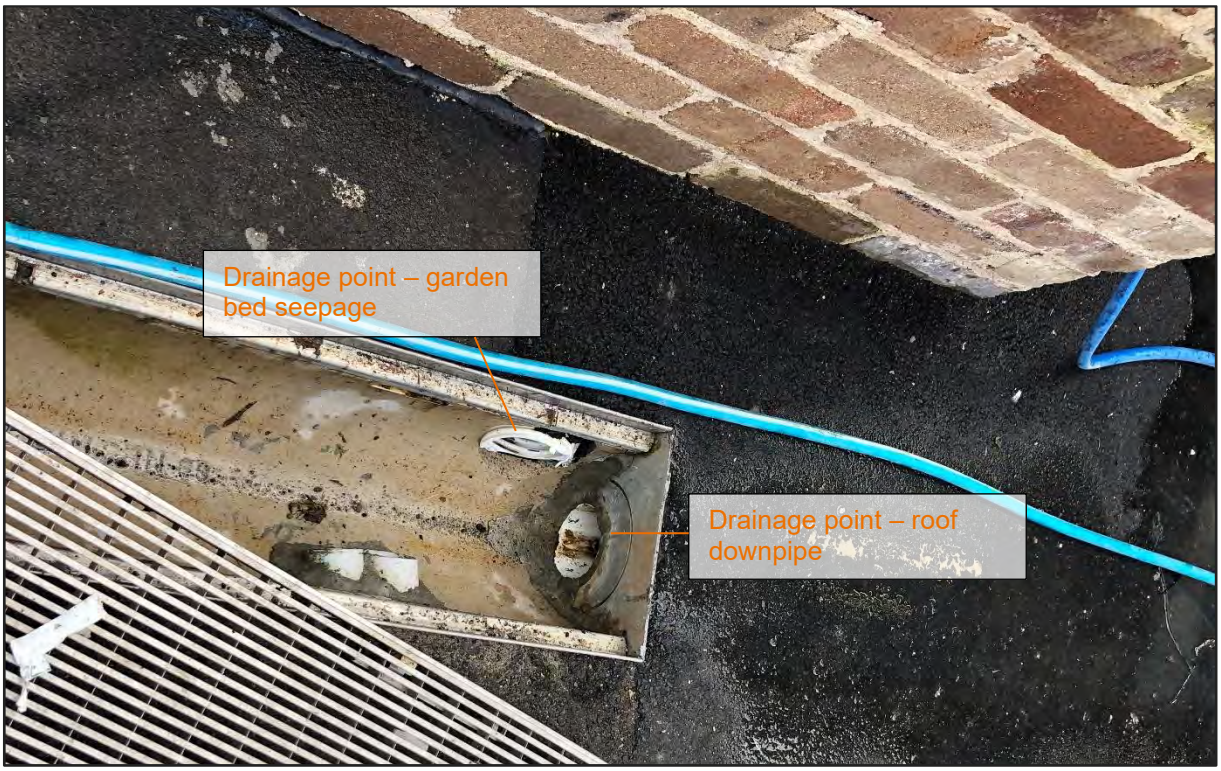

Photo 8. No validation testing was undertaken to either drainage pits due to lack of rainfall and not feasible to apply the tap water. Date: 21 April 2023.

Reference: 304500142_L003_pH_P1_Val_Rev0

Attachment C Calibration Certificate

WAMSCIENTIFIC
Your water and air monitoring equipment specialists

Certificate of Service and Calibration
Water Quality Meter
YSI Professional Plus

Company Name	WAM Scientific
Office Address	26 Bungarra Crescent, Chipping Norton NSW 2170
Phone Number	+61 405 241 484
Contact Name	William Pak
Instrument	YSI Pro Plus Water Quality Meter w/ 1m Quatro Cable
Serial Number	20B122031
Client Name	Chong Zeng (Stantec Australia)
Project Number	304500142
Comments	-

Instrument Check

Item	Test	Test Passed	Comments
2 x Alkaline C-size Batteries	Klein Tools MM300 Multimeter	✓	Both batteries reading above 2.9V
Battery Saver Function	Operation	✓	Automatically turns off after 60 minutes if idle
Unit Display	Operation	✓	Screen visible, no damage
Keypad	Operation	✓	Responsive, no damage
Connection Port and Cable	Condition/Check	✓	Clean, no damage
Monitor Housing	Condition/Check	✓	No damage
Firmware	Version	✓	4.0.0
pH Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
pH millivolts for pH 7.00	Calibration	✓	pH 7.00 calibration range between 0 mV ± 50 mV
pH millivolts for pH 4.00	Calibration	✓	pH 4 mV range +165 to +180 from 7 buffer mV value
pH slope	Calibration	✓	Range between 55 to 60 mV/pH (ideal value 59 mV)
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
ORP Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
ORP Reading	Calibration	✓	Within ± 80 mV of reference Zobell Reading
Response time < 90 seconds	Calibration	✓	Responds to correct value within 90 seconds
Conductivity/Temp Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
Conductivity Cell	Calibration	✓	Conductivity cell constant 5.0 ± 1.0 in GLP file
Clean Sensor Readings	Calibration	✓	Clean sensor reads less than 3 uS/cm in dry air
Dissolved Oxygen Probe	Condition/Calibration	✓	Calibrated and conforms to manufacturer's specs
DO Cap	Condition/Calibration	✓	1.25 mil PE membrane (yellow membrane)
DO Sensor in Use	Condition	✓	Polarographic DO sensor
DO Sensor Value	Calibration	✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA

Instrument Readings

Parameter	Standard Used	Reference No.	Calibration Value	Observed	Actual	Units
Temperature	Centre 370 Thermometer	Room Temp.	18.8	18.7	18.8	°C
pH	pH 4.00	386466	4.01	4.09	4.01	pH
pH	pH 7.00	387329	7.00	6.89	7.00	pH
Conductivity	2760 µs/cm at 25°C	388521	2760	2981	2760	µs/cm
ORP (Ref. check only)	Zobell A & B	380835/382785	240.1	233.9	240.1	mV
Zero Dissolved O_2	$NaSO_3$ in Distilled H_2O	389912	0.0	-3.3	0.0	%
100% Dissolved O_2	100% Air Saturated H_2O	Fresh Air	100.0	99.1	100.0	%

7Declaration

WAM Scientific certifies that the above instrument was successfully tested according to manufacturer's standards and all necessary checks were conducted to ensure the instrument was fully operational prior to dispatch. The calibration data supplied was obtained in accordance with manufacturer's specifications using solutions of known values.

Calibrated By	William Pak
Calibration Date	18/04/2023
Calibration Due	18/10/2023

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Your water and air monitoring equipment specialists

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E: accounts@wamscientific.com.au

Attachment D Weather Data

Australian Government
Bureau of Meteorology

Latest Weather Observations for Canterbury

IDN60801

Issued at 8:32 am EST Monday 24 April 2023 (issued every 10 minutes, with the page automatically refreshed every 10 minutes)

Station Details **ID:** 066194 **Name:** CANTERBURY RACECOURSE AWS **Lat:** -33.91 **Lon:** 151.11 **Height:** 3.0 m

Data from the previous 72 hours. | See also: Recent months at Canterbury

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
24/08:30am	20.7	21.9	16.9	79	2.3	W	6	9	3	5	-	-	0.4
24/08:00am	19.0	21.3	16.8	87	1.3	CALM	0	0	0	0	-	-	0.4
24/07:30am	17.0	19.3	16.8	99	0.1	CALM	0	0	0	0	-	-	0.4
24/07:00am	15.2	16.9	15.2	100	0.0	CALM	0	0	0	0	-	-	0.4
24/06:30am	14.7	15.8	14.7	100	0.0	WNW	2	7	1	4	-	-	0.4
24/06:00am	14.4	15.4	14.4	100	0.0	WSW	2	7	1	4	-	-	0.4
24/05:30am	14.7	16.2	14.7	100	0.0	CALM	0	0	0	0	-	-	0.4
24/05:00am	14.4	15.8	14.4	100	0.0	CALM	0	0	0	0	-	-	0.4
24/04:30am	14.2	15.1	14.0	99	0.1	ESE	2	9	1	5	-	-	0.4
24/04:00am	14.4	15.7	14.1	98	0.2	CALM	0	0	0	0	-	-	0.4
24/03:30am	14.3	15.3	13.3	94	0.6	CALM	0	6	0	3	-	-	0.4
24/03:00am	15.4	16.6	13.9	91	0.8	CALM	0	0	0	0	-	-	0.2
24/02:30am	17.4	17.1	13.3	77	2.3	ESE	7	11	4	6	-	-	0.2
24/02:00am	17.9	17.0	13.6	76	2.4	ESE	11	15	6	8	-	-	0.2
24/01:30am	18.9	17.8	14.2	74	2.7	ESE	13	19	7	10	-	-	0.2
24/01:00am	18.6	17.9	14.3	76	2.5	SE	11	17	6	9	-	-	0.2
24/12:30am	18.8	18.3	14.9	78	2.3	SE	11	17	6	9	-	-	0.2
24/12:00am	18.0	18.3	15.1	83	1.7	ESE	7	13	4	7	-	-	0.2

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
23/11:30pm	18.4	18.4	15.1	81	1.9	ESE	9	15	5	8	-	-	0.2
23/11:00pm	18.4	18.0	15.1	81	1.9	ESE	11	15	6	8	-	-	0.2
23/10:30pm	18.6	18.1	15.8	84	1.7	ESE	13	19	7	10	-	-	0.2
23/10:00pm	18.2	19.1	16.7	91	0.9	ESE	7	13	4	7	-	-	0.2
23/09:56pm	18.3	18.9	16.8	91	0.9	ESE	9	13	5	7	-	-	0.2
23/09:37pm	18.7	16.9	16.1	85	1.5	ESE	20	35	11	19	-	-	0.2
23/09:30pm	19.1	18.7	16.1	83	1.8	ESE	13	24	7	13	-	-	0.2
23/09:00pm	19.9	18.5	15.5	76	2.6	SE	17	28	9	15	-	-	0.2
23/08:30pm	20.1	18.7	15.5	75	2.7	SE	17	28	9	15	-	-	0.2

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
23/08:00pm	20.1	18.8	15.9	77	2.5	SE	17	26	9	14	-	-	0.2
23/07:30pm	20.4	19.9	15.0	71	3.2	ESE	11	15	6	8	-	-	0.2
23/07:00pm	20.4	19.8	14.7	70	3.3	ESE	11	19	6	10	-	-	0.2
23/06:30pm	20.3	19.4	14.9	71	3.2	ESE	13	19	7	10	-	-	0.2
23/06:00pm	20.5	19.1	14.6	69	3.4	ESE	15	22	8	12	-	-	0.2
23/05:30pm	20.2	19.5	15.4	74	2.8	SE	13	28	7	15	-	-	0.2
23/05:00pm	19.5	20.4	17.5	88	1.2	S	9	15	5	8	-	-	0.2
23/04:30pm	20.2	20.5	17.0	82	1.9	SSE	11	17	6	9	-	-	0.2
23/04:00pm	20.6	20.8	16.8	79	2.3	SSE	11	17	6	9	-	-	0.2
23/03:30pm	21.0	20.6	16.2	74	2.9	SSE	13	20	7	11	-	-	0.2
23/03:00pm	21.1	19.8	15.9	72	3.1	SE	17	22	9	12	-	-	0.2
23/02:30pm	22.5	21.4	16.3	68	3.8	SSE	17	26	9	14	-	-	0.0
23/02:00pm	22.3	20.8	15.4	65	4.1	SE	17	26	9	14	-	-	0.0
23/01:30pm	21.7	19.8	15.8	69	3.5	SE	20	30	11	16	-	-	0.0
23/01:00pm	22.5	21.2	14.9	62	4.5	SE	15	22	8	12	-	-	0.0
23/12:30pm	21.8	20.2	15.9	69	3.5	SSE	19	28	10	15	-	-	0.0
23/12:00pm	21.9	21.3	16.6	72	3.2	S	15	24	8	13	-	-	0.0
23/11:30am	20.5	20.3	15.7	74	2.9	SSE	11	19	6	10	-	-	0.0
23/11:00am	19.3	20.2	16.7	85	1.6	NNW	7	9	4	5	-	-	0.0
23/10:30am	18.4	19.5	17.2	93	0.7	WNW	7	11	4	6	-	-	0.0
23/10:00am	17.4	18.1	16.1	92	0.8	WNW	7	11	4	6	-	-	0.0
23/09:30am	17.2	18.1	16.6	96	0.4	W	7	13	4	7	-	-	0.0
23/09:00am	16.2	16.7	15.6	96	0.3	NW	7	11	4	6	-	-	0.4
23/08:30am	15.9	16.5	15.9	100	0.0	NW	7	9	4	5	-	-	0.4
23/08:00am	15.1	15.4	15.1	100	0.0	NNE	7	13	4	7	-	-	0.4
23/07:30am	14.6	15.3	14.6	100	0.0	NNW	4	7	2	4	-	-	0.4
23/07:00am	14.2	14.8	14.2	100	0.0	NNW	4	7	2	4	-	-	0.4
23/06:53am	14.1	15.0	14.1	100	0.0	NNW	2	7	1	4	-	-	0.4
23/06:30am	13.5	14.2	13.5	100	0.0	NNW	2	7	1	4	-	-	0.4
23/06:00am	13.3	14.3	13.3	100	0.0	CALM	0	0	0	0	-	-	0.4
23/05:30am	13.3	14.3	13.3	100	0.0	CALM	0	0	0	0	-	-	0.4
23/05:00am	13.5	14.6	13.5	100	0.0	CALM	0	0	0	0	-	-	0.4
23/04:30am	13.2	14.2	13.2	100	0.0	CALM	0	0	0	0	-	-	0.4
23/04:00am	13.6	14.7	13.6	100	0.0	CALM	0	0	0	0	-	-	0.2
23/03:30am	13.5	14.6	13.5	100	0.0	CALM	0	0	0	0	-	-	0.2
23/03:00am	14.5	15.9	14.5	100	0.0	CALM	0	0	0	0	-	-	0.2
23/02:30am	15.1	16.8	15.1	100	0.0	CALM	0	0	0	0	-	-	0.2
23/02:24am	15.1	16.8	15.1	100	0.0	CALM	0	0	0	0	-	-	0.2
23/02:00am	15.7	16.8	15.7	100	0.0	NNW	4	7	2	4	-	-	0.2
23/01:30am	16.0	18.0	16.0	100	0.0	CALM	0	0	0	0	-	-	0.2
23/01:00am	15.9	17.9	15.9	100	0.0	CALM	0	0	0	0	-	-	0.2
23/12:30am	16.1	18.1	16.1	100	0.0	CALM	0	0	0	0	-	-	0.2
23/12:00am	15.9	17.9	15.9	100	0.0	CALM	0	0	0	0	-	-	0.2

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
22/11:43pm	16.0	18.0	16.0	100	0.0	CALM	0	0	0	0	-	-	0.2
22/11:30pm	15.7	17.6	15.7	100	0.0	CALM	0	0	0	0	-	-	0.2
22/11:00pm	15.5	17.3	15.5	100	0.0	CALM	0	0	0	0	-	-	0.2
22/10:30pm	16.1	18.1	16.1	100	0.0	CALM	0	0	0	0	-	-	0.2
22/10:00pm	16.9	18.9	16.9	100	0.0	NNW	2	6	1	3	-	-	0.2
22/09:37pm	17.3	19.7	17.1	99	0.1	CALM	0	0	0	0	-	-	0.2
22/09:30pm	17.6	20.2	17.4	99	0.1	CALM	0	0	0	0	-	-	0.2
22/09:00pm	17.8	20.4	17.6	99	0.1	CALM	0	0	0	0	-	-	0.0
22/08:30pm	18.1	20.9	17.9	99	0.1	CALM	0	0	0	0	-	-	0.0
22/08:00pm	18.1	20.7	17.6	97	0.3	CALM	0	0	0	0	-	-	0.0
22/07:30pm	18.3	21.0	17.7	96	0.4	CALM	0	0	0	0	-	-	0.0
22/07:00pm	18.4	19.9	17.6	95	0.5	NW	6	7	3	4	-	-	0.0
22/06:30pm	18.6	21.0	17.1	91	0.9	CALM	0	0	0	0	-	-	0.0
22/06:00pm	18.8	21.2	16.9	89	1.1	CALM	0	2	0	1	-	-	0.0
22/05:30pm	19.3	20.4	16.7	85	1.6	NE	6	9	3	5	-	-	0.0
22/05:00pm	20.0	20.7	16.2	79	2.3	SE	7	13	4	7	-	-	0.0
22/04:30pm	20.1	20.4	15.9	77	2.5	SSE	9	15	5	8	-	-	0.0
22/04:00pm	20.0	19.8	15.6	76	2.6	SSE	11	17	6	9	-	-	0.0
22/03:30pm	20.3	19.9	15.3	73	3.0	SSE	11	19	6	10	-	-	0.0
22/03:00pm	20.4	19.3	15.4	73	3.0	SSE	15	22	8	12	-	-	0.0
22/02:30pm	20.5	19.4	15.3	72	3.1	SSE	15	24	8	13	-	-	0.0
22/02:00pm	20.6	19.0	14.9	70	3.3	SSE	17	26	9	14	-	-	0.0
22/01:30pm	20.5	18.8	14.8	70	3.3	SSE	17	28	9	15	-	-	0.0
22/01:00pm	20.4	18.5	14.3	68	3.5	SE	17	26	9	14	-	-	0.0
22/12:30pm	20.6	18.9	14.7	69	3.5	SSE	17	28	9	15	-	-	0.0
22/12:00pm	20.4	18.3	14.7	70	3.3	SSE	19	28	10	15	-	-	0.0
22/11:30am	20.7	19.0	14.6	68	3.6	SSE	17	28	9	15	-	-	0.0
22/11:00am	20.1	19.3	15.1	73	2.9	SSE	13	24	7	13	-	-	0.0
22/10:30am	17.8	18.3	12.7	72	2.8	NNW	2	6	1	3	-	-	0.0
22/10:00am	17.1	17.4	12.2	73	2.7	WSW	2	7	1	4	-	-	0.0
22/09:30am	16.4	15.8	11.6	73	2.6	WSW	6	9	3	5	-	-	0.0
22/09:00am	15.7	14.8	11.5	76	2.3	W	7	11	4	6	-	-	0.2
22/08:30am	14.7	13.7	11.1	79	1.9	WNW	7	11	4	6	-	-	0.2
22/08:00am	13.8	12.2	10.2	79	1.9	W	9	13	5	7	-	-	0.2
22/07:30am	13.4	12.1	10.0	80	1.8	W	7	13	4	7	-	-	0.2
22/07:00am	12.8	11.7	9.8	82	1.5	W	6	9	3	5	-	-	0.2
22/06:30am	12.6	11.4	9.4	81	1.6	W	6	9	3	5	-	-	0.2
22/06:00am	12.6	11.4	9.6	82	1.5	W	6	9	3	5	-	-	0.2
22/05:30am	12.3	11.6	9.9	85	1.2	W	4	9	2	5	-	-	0.2
22/05:00am	12.3	11.3	10.2	87	1.1	WNW	6	9	3	5	-	-	0.2
22/04:30am	12.0	11.8	10.4	90	0.8	NW	2	6	1	3	-	-	0.2
22/04:00am	11.8	10.8	10.2	90	0.8	WNW	6	11	3	6	-	-	0.2
22/03:30am	11.9	11.0	10.6	92	0.7	WNW	6	11	3	6	-	-	0.2
22/03:00am	12.2	11.1	10.6	90	0.8	WNW	7	11	4	6	-	-	0.2
22/02:30am	12.7	11.7	11.1	90	0.8	NW	7	9	4	5	-	-	0.2
22/02:00am	12.9	13.0	11.5	91	0.7	WNW	2	7	1	4	-	-	0.2
22/01:30am	13.5	14.0	11.7	89	1.0	CALM	0	6	0	3	-	-	0.2

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
22/01:00am	14.1	13.8	11.6	85	1.3	WNW	4	7	2	4	-	-	0.2
22/12:30am	14.7	14.1	11.8	83	1.6	NW	6	9	3	5	-	-	0.2
22/12:00am	15.2	14.7	12.2	82	1.6	NW	6	7	3	4	-	-	0.2

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta-T °C	Wind					Press QNH hPa	Press MSL hPa	Rain since 9am mm
						Dir	Spd km/h	Gust km/h	Spd kts	Gust kts			
21/11:30pm	15.5	15.2	12.6	83	1.6	WNW	6	7	3	4	-	-	0.2
21/11:00pm	15.6	15.2	12.9	84	1.5	WNW	7	11	4	6	-	-	0.2
21/10:30pm	15.0	15.5	13.9	93	0.6	WSW	4	9	2	5	-	-	0.2
21/10:00pm	13.8	14.5	12.2	90	0.9	CALM	0	0	0	0	-	-	0.2
21/09:30pm	14.2	14.5	12.1	87	1.1	SSE	2	6	1	3	-	-	0.2
21/09:00pm	15.4	15.5	12.7	84	1.5	SSE	4	7	2	4	-	-	0.2
21/08:30pm	15.2	15.4	12.0	81	1.7	SSE	2	46	1	25	-	-	0.2
21/08:00pm	16.3	15.9	12.3	77	2.2	S	6	9	3	5	-	-	0.2
21/07:30pm	18.0	17.7	12.7	71	3.0	SSE	6	15	3	8	-	-	0.2
21/07:00pm	18.9	18.3	12.2	65	3.7	SSW	7	11	4	6	-	-	0.2
21/06:30pm	19.0	18.0	12.3	65	3.7	S	9	17	5	9	-	-	0.2
21/06:00pm	19.2	18.3	12.5	65	3.7	S	9	15	5	8	-	-	0.2
21/05:30pm	19.2	17.8	12.2	64	3.9	S	11	15	6	8	-	-	0.2
21/05:00pm	19.3	17.5	12.1	63	4.0	SSE	13	20	7	11	-	-	0.2
21/04:30pm	19.4	17.3	12.4	64	3.9	SSE	15	26	8	14	-	-	0.2
21/04:00pm	19.8	17.3	12.3	62	4.2	SSE	17	32	9	17	-	-	0.2
21/03:30pm	20.0	16.0	11.8	59	4.5	SSE	24	32	13	17	-	-	0.2
21/03:00pm	20.2	16.6	11.9	59	4.6	SSE	22	33	12	18	-	-	0.2
21/02:30pm	20.1	17.4	11.6	58	4.7	S	17	26	9	14	-	-	0.2
21/02:00pm	19.2	16.8	11.5	61	4.2	S	15	24	8	13	-	-	0.0
21/01:30pm	20.1	17.2	11.1	56	4.9	SSE	17	24	9	13	-	-	0.0
21/01:00pm	20.8	18.6	12.0	57	4.9	SSE	15	24	8	13	-	-	0.0
21/12:30pm	20.7	18.3	11.3	55	5.2	SSE	15	24	8	13	-	-	0.0
21/12:00pm	20.1	16.9	11.8	59	4.6	SSE	20	30	11	16	-	-	0.0
21/11:30am	20.6	18.6	12.8	61	4.4	S	15	22	8	12	-	-	0.0
21/11:00am	21.2	19.8	13.4	61	4.5	S	13	20	7	11	-	-	0.0
21/10:30am	20.0	17.9	12.5	62	4.2	SSE	15	20	8	11	-	-	0.0
21/10:00am	19.7	17.6	12.5	63	4.0	S	15	26	8	14	-	-	0.0
21/09:30am	19.3	17.3	12.6	65	3.8	SSW	15	28	8	15	-	-	0.0
21/09:00am	18.7	17.8	12.7	68	3.4	SSW	9	13	5	7	-	-	12.4

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APPENDIX 5 – TL927-1-39F01 2023 WE42 NOISE MONITORING REPORT

28 April 2023
TL927-1-39F01 2023 WE42 Noise Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - 2023 WE42 Possession Noise Monitoring Report

1 Introduction

Renzo Tonin & Associates was engaged by Downer EDI Works to conduct noise monitoring during the WE42 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model prepared for the works (Gatewave scenario ID: 6868). This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Dulwich Hill and Hurlstone Park Station on 15th April 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The measurement locations are listed in Table 2-1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2-1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	57a Ewart Street, Dulwich Hill (Appendix A.1)	15.04.2023 07:16pm – 07:31pm	Lighting tower and excavator	Noise	25m	No
M2	65 Ewart Street, Dulwich Hill (Appendix A.1)	15.04.2023 07:36pm – 07:51pm	Lighting tower and excavator	Noise	15-30m	No
M3	71 Ewart Street, Dulwich Hill (Appendix A.1)	15.04.2023 07:54pm – 08:09pm	Lighting tower, jackhammer and excavator	Noise	170m	No
M4	105 Duntroon Street, Hurlstone Park (Appendix A.2)	15.04.2023 08:21pm – 08:36pm	Lighting tower, EWP and 2x mobile cranes	Noise	10m	No
M5	5 Railway Street, Hurlstone Park (Appendix A.2)	15.04.2023 08:49pm – 09:04pm	No construction work was observed during the monitoring period	Noise	N/A	No
M6	46 Floss Street, Hurlstone Park (Appendix A.2)	15.04.2023 09:12pm – 09:27pm	Lighting tower and mobile crane	Noise	70m	No

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel & Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2-2 summarises the details of noise measurement equipment.

Table 2-2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	A2A-13529-E0	9 February 2022
Type 1 Sound Level Meter Calibrator	Bruel & Kjaer	Type 4231	3016756	5 July 2022

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2-3. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2-3: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	57a Ewart Street, Dulwich Hill	15.04.2023 07:16pm – 07:31pm	Cloudy; air temperature 21ºC, wind speed < 5m/s; relative humidity 61%
M2	65 Ewart Street, Dulwich Hill	15.04.2023 07:36pm – 07:51pm	Cloudy; air temperature 20ºC, wind speed < 5m/s; relative humidity 60%
M3	71 Ewart Street, Dulwich Hill	15.04.2023 07:54pm – 08:09pm	Partly cloudy; air temperature 20ºC, wind speed < 5m/s; relative humidity 61%
M4	105 Duntroon Street, Hurlstone Park	15.04.2023 08:21pm – 08:36pm	Partly cloudy; air temperature 20ºC, wind speed < 5m/s; relative humidity 61%
M5	5 Railway Street, Hurlstone Park	15.04.2023 08:49pm – 09:04pm	Partly cloudy; air temperature 18ºC, wind speed < 5m/s; relative humidity 62%
M6	46 Floss Street, Hurlstone Park	15.04.2023 09:12pm – 09:27pm	Partly cloudy; air temperature 18ºC, wind speed < 5m/s; relative humidity 59%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3-1 below.

Table 3-1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	57a Ewart Street, Dulwich Hill	Lighting tower, non-powered hand tools, 20t Franna crane, EWP, hand tools, concrete agi, generator, dump truck, 5t excavator with hammer attachment, drill rig, 13t excavator with bucket attachment, 20t mobile crane, concrete truck & delivery truck.	84[H]	Lighting tower and excavator	59	82	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The predicted noise level included high noise impact activities. No high noise impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M2	65 Ewart Street, Dulwich Hill	Lighting tower, non-powered hand tools, 20t Franna crane, EWP, hand tools, concrete agi, generator, dump truck, 5t excavator with hammer attachment, drill rig, 13t excavator with bucket attachment, 20t mobile crane, concrete truck & delivery truck.	81[H]	Lighting tower and excavator	55	69	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The predicted noise level included high noise impact activities. No high noise impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 15-30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M3	71 Ewart Street, Dulwich Hill	Lighting tower, non-powered hand tools, 20t Franna crane, EWP, hand tools, concrete agi, generator, dump truck, 5t excavator with hammer attachment, drill rig, 13t excavator with bucket attachment, 20t mobile crane, concrete truck & delivery truck.	83[H]	Lighting tower, jackhammer and excavator	58 (53+5)*	77	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured jackhammering works were located approximately 170m away. In the prediction model, the distance between the closest high impact work area and the most affected facade is 50m. • It was noted that the measured works were intermittent.
M4	105 Duntroon Street, Hurlstone Park	Traffic control utes, delivery truck, 20t Franna crane, hand tools, 5t excavator with bucket attachment, 13t excavator with bucket attachment, lighting Tower & EWP	81[T]	Lighting tower, EWP and 2x mobile crane	61	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 10m away. In the prediction model, the distance between the closest work area and the most affected facade is 3m. • It was noted that the measured works were intermittent.
M5	5 Railway Street, Hurlstone Park	Traffic control utes, delivery truck, 20t Franna crane, hand tools, 5t excavator with bucket attachment, 13t excavator with bucket attachment, lighting Tower & EWP	Not applicable	No construction work was observed during the monitoring period	45	63	Not applicable	No construction work was observed during the monitoring period.
M6	46 Floss Street, Hurlstone Park	Traffic control utes, delivery truck, 20t Franna crane, hand tools, 5t excavator with bucket attachment, 13t excavator with bucket attachment, lighting Tower & EWP	73[T]	Lighting tower and mobile crane	54	69	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 70m away. In the prediction model, the distance between the closest work area and the most affected facade is 30m. • It was noted on site that the mobile crane was seen operating however no works were audible during this measurement period.

Notes:
*: 5dB(A) penalty applied for high impact activities.
T: Predicted $L_{Aeq, 15min}$ for Typical activities.
H: Predicted $L_{Aeq, 15min}$ for High impact activities.

4 Conclusion

Renzo Tonin & Associates has completed noise monitoring during the WE42 possession for Sydney Metro Southwest Station Upgrades works.

The results of the noise measurements were below the predicted noise levels presented in the Gatewave model prepared for the works.

The difference between the measured $L_{Aeq,\ 15min}$ and the predicted noise level can be attributed to following:

- Less plant and equipment operating during the measurement compared to the modelled plants.
- Location of the measured works were further away than the modelled works.
- Intermittent nature of the measured works.

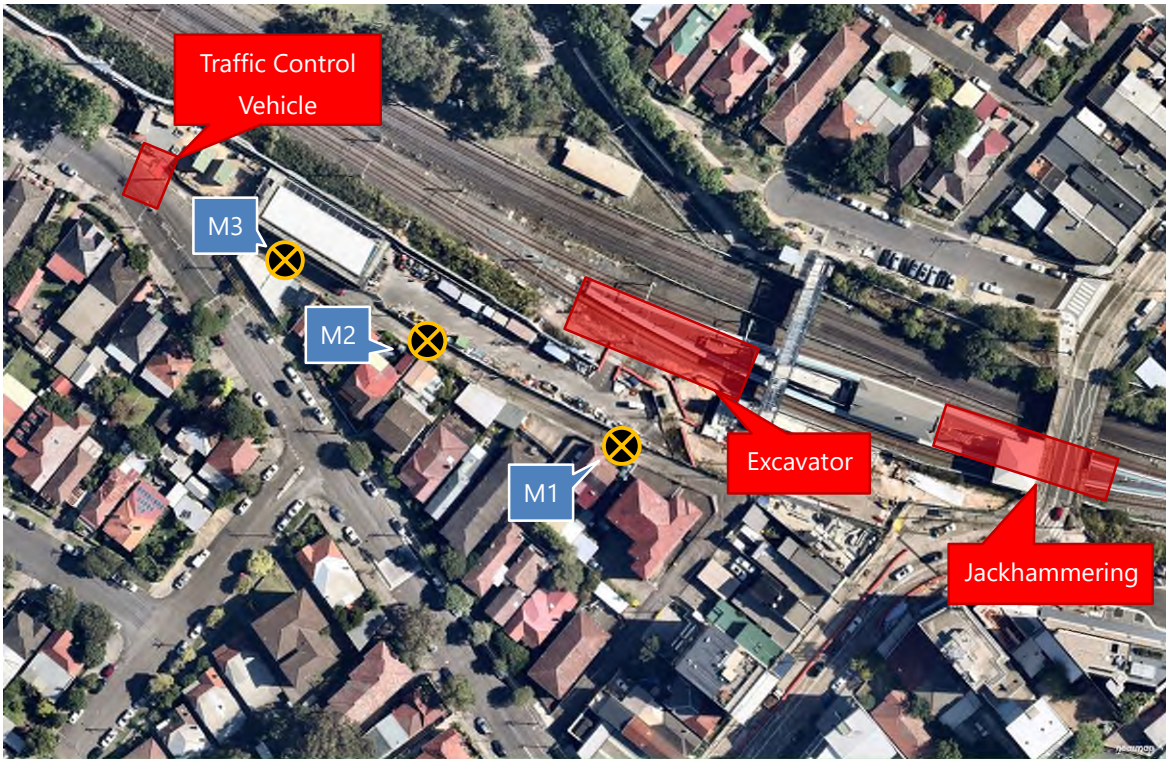
Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
28.04.2023	First issue	0	1	A. Hannelly	R. Zhafranata	R. Zhafranata

File Path: R:\AssocSydProjects\TL901-TL950\TL927 Southwest Metro - Stations Upgrades\1 Docs\39 15.04.2023 WE42 Noise Monitoring\TL927-1-39F01 2023 WE42 Noise Monitoring Report (r1).docx

APPENDIX A Measurement locations

A.1 Dulwich Hill Station: 57a Ewart Street, 65 Ewart Street & 71 Ewart Street



A.2 Hurlstone Park Station: 46 Floss Street, 5 Railway Street & 105 Duntroon Street

APPENDIX 6 – TL927-1-40F01 2023 WE43 NOISE MONITORING REPORT

3 May 2023
TL927-1-40F01 2023 WE43 Noise Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - 2023 WE43 Possession Noise Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise monitoring during the WE43 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model prepared for the works (Gatewave scenario ID: 6911). This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Dulwich Hill, Campsie, Punchbowl, Belmore and Hurlstone Park Station on 22nd April 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The measurement locations are listed in Table 2-1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2-1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	41 Urunga Parade, Punchbowl (APPENDIX A.4)	22.04.2023 12:50pm – 01:05pm	Vacuum truck and power hand tools	Noise	60m	No
M2	4 Richard Street, Punchbowl (APPENDIX A.4)	22.04.2023 01:07pm – 01:22pm	Flatbed truck	Noise	90m	No
M3	30 Redman Parade, Belmore (APPENDIX A.5)	22.04.2023 01:55pm – 02:10pm	Power hand tool (drill)	Noise	60m	No
M4	1 Acacia Street, Belmore (APPENDIX A.5)	22.04.2023 02:16pm – 02:31pm	EWP and flatbed truck	Noise	50m	No
M5	13-15 Anglo Road, Campsie (APPENDIX A.3)	22.04.2023 02:41pm – 02:56pm	Generator, excavator, power hand tool (grinder) and hydrema	Noise	10m – 65m	Noise blankets installed around the generator
M6	2 Wilfred Avenue, Campsie (APPENDIX A.3)	22.04.2023 03:03pm – 03:18pm	Power hand tools, hand tools and EWP	Noise	30m	No
M7	32-34 Campsie Street, Campsie (APPENDIX A.3)	22.04.2023 03:22pm – 03:37pm	Hand tools and EWP	Noise	30m	No
M8	5 Railway Street, Hurlstone Park (APPENDIX A.2)	22.04.2023 03:55pm – 04:10pm	Power hand tools and forklift	Noise	40m	No
M9	105 Duntroon Street, Hurlstone Park (APPENDIX A.2)	22.04.2023 04:16pm – 04:31pm	EWP, power hand tools and pressure washer	Noise	10m – 50m	No
M10	3A Commons Street, Hurlstone Park (APPENDIX A.2)	22.04.2023 04:37pm – 04:52pm	Power hand tools	Noise	70m	No
M11	57a Ewart Street, Dulwich Hill (APPENDIX A.1)	22.04.2023 05:06pm – 05:21pm	Mobile crane, power hand tools and EWP	Noise	30m	No
M12	65 Ewart Street, Dulwich Hill (APPENDIX A.1)	22.04.2023 05:22pm – 05:37pm	Mobile crane, EWP, lighting tower and hand tools	Noise	10m – 80m	No
M13	71 Ewart Street, Dulwich Hill (APPENDIX A.1)	22.04.2023 05:39pm – 05:54pm	Lighting tower	Noise	15m	No

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M14	71 Ewart Street, Dulwich Hill (APPENDIX A.1)	22.04.2023 07:17pm – 07:32pm	Lighting tower, brick stacking	Noise	15m – 25m	No
M15	65 Ewart Street, Dulwich Hill (APPENDIX A.1)	22.04.2023 07:34pm – 07:49pm	Lighting tower, brick stacking and excavator	Noise	25m – 35m	No
M16	57a Ewart Street, Dulwich Hill (APPENDIX A.1)	22.04.2023 07:52pm – 07:07pm	Lighting tower, EWP and hand tools	Noise	30m	No
M17	13-15 Anglo Road, Campsie (APPENDIX A.3)	22.04.2023 08:33pm – 08:48pm	Generator	Noise	10m	Noise blankets installed around the generator

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2-2 summarises the details of noise measurement equipment.

Table 2-2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	A2A-20889-E0	25 July 2022
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	3016756	5 July 2022

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2-3. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2-3: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	41 Urunga Parade, Punchbowl	22.04.2023 12:50pm – 01:05pm	Cloudy; air temperature 18ºC, wind speed < 5m/s; relative humidity 52%
M2	4 Richard Street, Punchbowl	22.04.2023 01:07pm – 01:22pm	Cloudy; air temperature 18ºC, wind speed < 5m/s; relative humidity 51%

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M3	30 Redman Parade, Belmore	22.04.2023 01:55pm – 02:10pm	Cloudy; air temperature 18ºC, wind speed < 5m/s; relative humidity 50%
M4	1 Acacia Street, Belmore	22.04.2023 02:16pm – 02:31pm	Cloudy; air temperature 19ºC, wind speed < 5m/s; relative humidity 49%
M5	13-15 Anglo Road, Campsie	22.04.2023 02:41pm – 02:56pm	Cloudy; air temperature 17ºC, wind speed < 5m/s; relative humidity 49%
M6	2 Wilfred Avenue, Campsie	22.04.2023 03:03pm – 03:18pm	Cloudy; air temperature 16ºC, wind speed < 5m/s; relative humidity 48%
M7	32-34 Campsie Street, Campsie	22.04.2023 03:22pm – 03:37pm	Cloudy; air temperature 16ºC, wind speed < 5m/s; relative humidity 50%
M8	5 Railway Street, Hurlstone Park	22.04.2023 03:55pm – 04:10pm	Cloudy; air temperature 17ºC, wind speed < 5m/s; relative humidity 49%
M9	105 Duntroon Street, Hurlstone Park	22.04.2023 04:16pm – 04:31pm	Cloudy; air temperature 16ºC, wind speed < 5m/s; relative humidity 48%
M10	3A Commons Street, Hurlstone Park	22.04.2023 04:37pm – 04:52pm	Cloudy; air temperature 18ºC, wind speed < 5m/s; relative humidity 49%
M11	57a Ewart Street, Dulwich Hill	22.04.2023 05:06pm – 05:21pm	Cloudy; air temperature 17ºC, wind speed < 5m/s; relative humidity 47%
M12	65 Ewart Street, Dulwich Hill	22.04.2023 05:22pm – 05:37pm	Cloudy; air temperature 17ºC, wind speed < 5m/s; relative humidity 48%
M13	71 Ewart Street, Dulwich Hill	22.04.2023 05:39pm – 05:54pm	Cloudy; air temperature 16ºC, wind speed < 5m/s; relative humidity 46%
M14	71 Ewart Street, Dulwich Hill	22.04.2023 07:17pm – 07:32pm	Cloudy; air temperature 17ºC, wind speed < 5m/s; relative humidity 47%
M15	65 Ewart Street, Dulwich Hill	22.04.2023 07:34pm – 07:49pm	Cloudy; air temperature 16ºC, wind speed < 5m/s; relative humidity 48%
M16	57a Ewart Street, Dulwich Hill	22.04.2023 07:52pm – 07:07pm	Cloudy; air temperature 17ºC, wind speed < 5m/s; relative humidity 47%
M17	13-15 Anglo Road, Campsie	22.04.2023 08:33pm – 08:48pm	Cloudy; air temperature 17ºC, wind speed < 5m/s; relative humidity 52%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3-1 below.

Table 3-1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	41 Urunga Parade, Punchbowl	10T hi-rail Hydrema, 15T hi-rail excavator, EWP, 20T franna crane, hand tool - grinder and power hand tools	65^{T}	Vacuum truck and power hand tools	50	72	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The predicted noise level included grinding activity. No grinding works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • It was noted that the measured works were intermittent.
M2	4 Richard Street, Punchbowl	10T hi-rail Hydrema, 15T hi-rail excavator, EWP, 20T franna crane, hand tool - grinder and power hand tools	63^{T}	Flatbed truck	50	70	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The predicted noise level included grinding activity. No grinding works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • It was noted that the measured works were intermittent.
M3	30 Redman Parade, Belmore	Lighting tower, non-powered hand tools, 20t franna crane, handtool - drill, handtool – rattle gun, power hand tools and jackhammer	65^{H}	Power hand tool (drill)	62	81	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • It was noted that the measured works were intermittent. • It was noted that the road traffic on Redman Parade and Burwood Road was the dominating noise source during the measurement.
M4	1 Acacia Street, Belmore	Lighting tower, non-powered hand tools, 20t franna crane, handtool - drill, handtool – rattle gun, power hand tools and jackhammer	65^{H}	EWP and flatbed truck	52	71	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • It was noted that the site office buildings were providing shielding to the measured works. • It was noted that the measured works were intermittent.
M5	13-15 Anglo Road, Campsie	10T hi-rail Hydrema, 15T hi-rail excavator, EWP, hand tools, power hand tools, rattle gun, 20T franna crane, 20T mobile crane, welding tools, handtool - grinder and delivery truck	71^{T}	Generator, excavator, power hand tool (grinder) and hydrema	67 (62+5)*	75	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured grinding works were located approximately 65m away. In the prediction model, the distance between the closest grinding work area and the most affected facade is 20m.
M6	2 Wilfred Avenue, Campsie	10T hi-rail Hydrema, 15T hi-rail excavator, EWP, hand tools, power hand tools, rattle gun, 20T franna crane, 20T mobile crane, welding tools, handtool - grinder and delivery truck	54^{T}	Power hand tools, hand tools and EWP	61	85	Yes ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is above the predicted noise level. This can be attributed to: • Other contractors working in the green shaded area (as shown in Appendix A.3). • EWP and power hand tool works occurring in the green shaded area (as shown in Appendix A.3) which were not Downer works.
M7	32-34 Campsie Street, Campsie	10T hi-rail Hydrema, 15T hi-rail excavator, EWP, hand tools, power hand tools, rattle gun, 20T franna crane, 20T mobile crane, welding tools, handtool - grinder and delivery truck	50^{T}	Hand tools and EWP	57	75	Yes ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is above the predicted noise level. This can be attributed to: • Other contractors working in the green shaded area (as shown in Appendix A.3). • EWP and power hand tool works occurring in the green shaded area (as shown in Appendix A.3) which were not Downer works.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M8	5 Railway Street, Hurlstone Park	20T Franna crane, EWP, lighting tower, hand tools, 13T excavator with bucket attachment, 10T hi-rail hydrema, 5T excavator with hammer attachment, pressure washer, jackhammer and delivery truck.	78[H]	Power hand tools and forklift	51	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M9	105 Duntroon Street, Hurlstone Park	20T Franna crane, EWP, lighting tower, hand tools, 13T excavator with bucket attachment, 10T hi-rail hydrema, 5T excavator with hammer attachment, pressure washer, jackhammer and delivery truck.	84[H]	EWP, power hand tools and pressure washer	62	80	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 10m – 50m away. In the prediction model, the distance between the closest jackhammering work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M10	3A Commons Street, Hurlstone Park	20T Franna crane, EWP, lighting tower, hand tools, 13T excavator with bucket attachment, 10T hi-rail hydrema, 5T excavator with hammer attachment, pressure washer, jackhammer and delivery truck.	82[H]	Power hand tools	52	77	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included jackhammering activity. No jackhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 70m away. In the prediction model, the distance between the closest jackhammering work area and the most affected facade is 10m. • It was noted that the measured works were intermittent.
M11	57a Ewart Street, Dulwich Hill	13T Excavator with bucket attachment, delivery trucks, 20T franna crane, EWP, concrete truck, hand tools, generator, 5T excavator with hammer attachment, dump truck, 20T mobile crane, drill rig and concrete agi	83[H]	Mobile crane, power hand tools and EWP	54	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 30m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M12	65 Ewart Street, Dulwich Hill	13T Excavator with bucket attachment, delivery trucks, 20T franna crane, EWP, concrete truck, hand tools, generator, 5T excavator with hammer attachment, dump truck, 20T mobile crane, drill rig and concrete agi	81[H]	Mobile crane, EWP, lighting tower and hand tools	55	69	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 10m – 80m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 20m. • It was noted that the measured works were intermittent.
M13	71 Ewart Street, Dulwich Hill	13T Excavator with bucket attachment, delivery trucks, 20T franna crane, EWP, concrete truck, hand tools, generator, 5T excavator with hammer attachment, dump truck, 20T mobile crane, drill rig and concrete agi	84[H]	Lighting tower	57	76	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • Only the lighting tower was audible at this monitoring location. • The measured works were located approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M14	71 Ewart Street, Dulwich Hill	13T Excavator with bucket attachment, delivery trucks, 20T franna crane, EWP, concrete truck, hand tools, generator, 5T excavator with hammer attachment, dump truck, 20T mobile crane, drill rig and concrete agi	84[H]	Lighting tower, brick stacking	53	71	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 15m – 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M15	65 Ewart Street, Dulwich Hill	13T Excavator with bucket attachment, delivery trucks, 20T franna crane, EWP, concrete truck, hand tools, generator, 5T excavator with hammer attachment, dump truck, 20T mobile crane, drill rig and concrete agi	81[H]	Lighting tower, brick stacking and excavator	54	73	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 25m – 35m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 20m. • It was noted that the measured works were intermittent.
M16	57a Ewart Street, Dulwich Hill	13T Excavator with bucket attachment, delivery trucks, 20T franna crane, EWP, concrete truck, hand tools, generator, 5T excavator with hammer attachment, dump truck, 20T mobile crane, drill rig and concrete agi	83[H]	Lighting tower, EWP and hand tools	52	65	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included rockhammering activity. No rockhammering works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • The measured works were located approximately 30m away. In the prediction model, the distance between the closest rockhammering work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M17	13-15 Anglo Road, Campsie	10T hi-rail Hydrema, 15T hi-rail excavator, EWP, hand tools, power hand tools, rattle gun, 20T franna crane, 20T mobile crane, welding tools, handtool - grinder and delivery truck	71[T]	Generator	62	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is lower than the predicted noise level. This can be attributed to: • The predicted noise level included grinding activity. No grinding works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled plants. • It was noted on site that no works were occurring other than the generator operating.

Notes:
T: Predicted $L_{Aeq, 15min}$ for Typical activities.
H: Predicted $L_{Aeq, 15min}$ for High impact activities.
*: 5 dB penalty due to annoying characteristics.

4 Conclusion

Renzo Tonin and Associates has completed noise monitoring during the WE43 possession for Sydney Metro Southwest Station Upgrades works.

The results of the noise measurements were typically below the predicted noise levels presented in the Gatewave model prepared for the works, except for measurement M6 and M7 which were not caused by Downer works.

The difference between the measured $L_{Aeq,\ 15min}$ and the predicted noise level can be attributed to following:

- Less plant and equipment operating during the measurement compared to the modelled plants.
- Location of the measured works were further away than the modelled works.
- Intermittent nature of the measured works.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
03.05.2023	First issue	0	1	A. Hannelly	R. Zhafranata	R. Zhafranata

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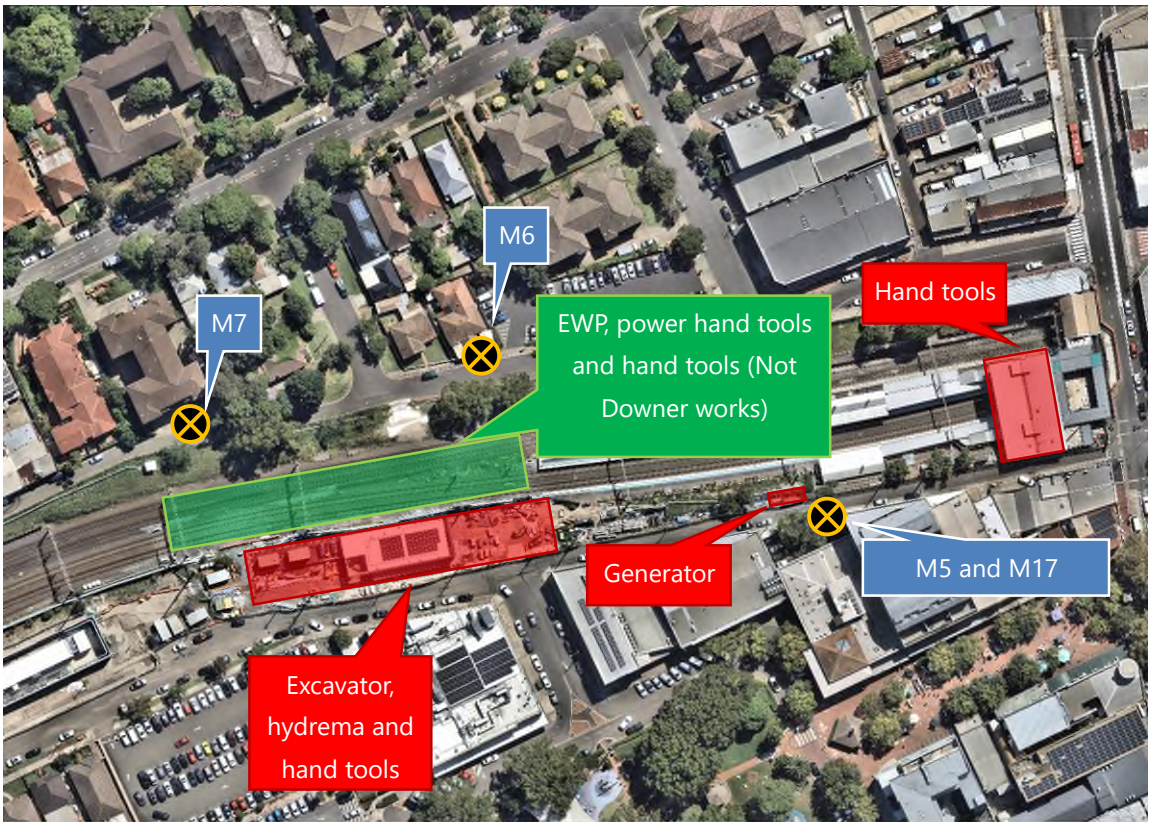
APPENDIX A Monitoring locations

A.1 Dulwich Hill Station: 57a Ewart Street, 65 Ewart Street and 71 Ewart Street

A.2 Hurlstone Park Station: 5 Railway Street, 3A Commons Street and 105 Duntroon Street

A.3 Campsie Station: 13-15 Anglo Road, 2 Wilfred Avenue and 32-34 Campsie Street



A.4 Punchbowl Station: 41 Urunga Parade and 4 Richard Street

A.5 Belmore Station: 1 Acacia Street and 30 Redman Parade

APPENDIX 7 – TL927-1-41F01 2023 WK45 NOISE MONITORING REPORT

10 May 2023
TL927-1-41F01 2023 WE45 Noise Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - 2023 WE45 Possession Noise Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise monitoring during the WE45 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model prepared for the works (Gatewave scenario ID: 7236). This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Dulwich Hill, Campsie, and Hurlstone Park Stations on 6th May 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The measurement locations are listed in Table 2-1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2-1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	57A Ewart Street, Dulwich Hill (Appendix A.1)	06.05.2023 01:19pm – 01:35pm	EWP (x2), hydrema (idling)	Noise	23m-41m	-
M2	51 Ewart Lane, Dulwich Hill (Appendix A.1)	06.05.2023 01:42pm – 01:57pm	EWP (x2), hydrema (idling), hand tools (non-powered)	Noise	11m–32m	-
M3	67 Ewart Street, Dulwich Hill (Appendix A.1)	06.05.2023 02:05pm – 02:20pm	Hydrema (idling), hand tools (non-powered)	Noise	75m–92m	-
M4	32-34 Campsie Street, Campsie (Appendix A.3)	06.05.2023 02:56pm – 03:11pm	15t excavator with bucket attachment, hand tools	Noise	112m	-
M5	13-15 Anglo Road, Campsie (Appendix A.3)	06.05.2023 03:21pm – 03:36pm	Generator, drop saw, positrack, hand tools (non-powered)	Noise	33-57m	Noise blankets around generator on Lillian Lane. Noise blankets around drop saw on station concourse.
M6	2 Wilfred Avenue, Campsie (Appendix A.3)	06.05.2023 03:46pm – 04:04pm	Hand tools, positrack	Noise	36m-53m	-
M7	5 Railway Street, Hurlstone Park (Appendix A.2)	06.05.2023 04:29pm – 04:44pm	Light vehicles, hand tools	Noise	25m	-
M8	105 Duntroon Street, Hurlstone Park (Appendix A.2)	06.05.2023 04:54pm – 05:09pm	Mobile crane, EWP (x2), power tools, light vehicles	Noise	23m-41m	-
M9	32-34 Campsie Street, Campsie (Appendix A.3)	06.05.2023 05:44pm – 05:59pm	Positrack, generator, light vehicles	Noise	180-250m	Noise blankets around generator on Lillian Lane.

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2-2 summarises the details of noise measurement equipment.

Table 2-2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	A2A-12528-E0	20 April 2022
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	3015756	5 July 2022

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2-3. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2-3: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	57A Ewart Street, Dulwich Hill	06.05.2023 01:19pm – 01:35pm	Clear skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 39%
M2	51 Ewart Lane, Dulwich Hill	06.05.2023 01:42pm – 01:57pm	Clear skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 39%
M3	67 Ewart Street, Dulwich Hill	06.05.2023 02:05pm – 02:20pm	Clear skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 36%
M4	32-34 Campsie Street, Campsie	06.05.2023 02:56pm – 03:11pm	Clear skies; air temperature 22ºC, wind speed < 5m/s; relative humidity 39%
M5	13-15 Anglo Road, Campsie	06.05.2023 03:21pm – 03:36pm	Clear skies; air temperature 22ºC, wind speed < 5m/s; relative humidity 39%
M6	2 Wilfred Avenue, Campsie	06.05.2023 03:46pm – 04:04pm	Clear skies; air temperature 22ºC, wind speed < 5m/s; relative humidity 40%
M7	5 Railway Street, Hurlstone Park	06.05.2023 04:29pm – 04:44pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 49%
M8	105 Duntroon Street, Hurlstone Park	06.05.2023 04:54pm – 05:09pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 49%
M9	32-34 Campsie Street, Campsie	06.05.2023 05:44pm – 05:59pm	Clear skies; air temperature 17ºC, wind speed < 5m/s; relative humidity 58%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3-1 below.

Table 3-1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	57A Ewart Street, Dulwich Hill	EWP, Handtool – drill, Generator, Telehander / Franna crane (20t), Excavator w bucket (13t), Roller (2t) - low vibration mode, Handtool – grinder, Compactor / Wacker packer	80[H]	EWP (x2), hydrema (idling), hand tools (non-powered)	58	73	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The predicted noise level included grinding activity. No grinding works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • Noise from use of hand tools occurred within the station building. • The hydrema was not operating under load. • No high impact plant was operating during the measurement. • The measured works were located approximately 23m - 41m away. In the prediction model, the distance between the closest work area and the most affected facade is 8m. • It was noted that the measured works were intermittent.
M2	51 Ewart Lane, Dulwich Hill	EWP, Handtool – drill, Generator, Telehander / Franna crane (20t), Excavator w bucket (13t), Roller (2t) - low vibration mode, Handtool – grinder, Compactor / Wacker packer	78[H]	EWP (x2), hydrema (idling), hand tools (non-powered)	61	70	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • Noise from use of hand tools occurred within the station building. • The hydrema was not operating under load. • No high impact plant was operating during the measurement. • The measured works were located approximately 11m – 32m away. In the prediction model, the distance between the closest work area and the most affected facade is 9m. • It was noted that the measured works were intermittent.
M3	67 Ewart Street, Dulwich Hill	EWP, Handtool – drill, Generator, Telehander / Franna crane (20t), Excavator w bucket (13t), Roller (2t) - low vibration mode, Handtool – grinder, Compactor / Wacker packer	80[H]	Hydrema (idling), hand tools (non-powered)	52	70	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • Noise from use of hand tools occurred within the station building. • The hydrema was not operating under load. • No high impact plant was operating during the measurement. • Works occurred predominately around the station building. • The measured works were located approximately 75m - 92m away. In the prediction model, the distance between the closest work area and the most affected facade is 7m. • It was noted that the measured works were intermittent.
M4	32-34 Campsie Street, Campsie	EWP, Handtool – grinder, Hand tools, 10T hi-rail Hydrema, 15T hi-rail excavator	68[H]	15t excavator with bucket attachment, hand tools	52	68	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • Works around the concourse including grinders were inaudible during the monitoring period. • The measured works were located approximately 112m away. In the prediction model, the distance between the closest work area and the most affected facade is 31m. • Works at the end of the platform were low impact activities and intermittent in nature.
M5	13-15 Anglo Road, Campsie	EWP, Handtool – grinder, Hand tools, 10T hi-rail Hydrema, 15T hi-rail excavator	74[H]	Generator, drop saw, positrack, hand tools (non-powered)	64 (59+5)*	71	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were located approximately 33m – 57m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m. • It was noted that the measured works including saw cutting were intermittent.
M6	2 Wilfred Avenue, Campsie	EWP, Handtool – grinder, Hand tools, 10T hi-rail Hydrema, 15T hi-rail excavator	69[H]	Hand tools, positrack	53	72	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • Works around the concourse including grinders were inaudible during the monitoring period. • The measured works were located approximately 36m – 53m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m. • Works at the end of the platform were low impact activities and intermittent in nature.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M7	5 Railway Street, Hurlstone Park	Handtool - saw Handtool - grout / hand mixer Hand tools Light vehicles / traffic control utes Delivery truck Telehander / Franna crane (20t)	76[T]	Light vehicles, hand tools	48	71	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were located approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M8	105 Duntroon Street, Hurlstone Park	Mobile crane (20t-250t) EWP Handtool - drill Street sweeper Excavator w bucket (13t)	81[T]	Mobile crane, EWP (x2), Hand tools, light vehicles	61	81	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The mobile crane and EWP did not operate continuously under high load. • The majority of noise generating plant e.g. mobile crane engine and EWP engines were located below the monitoring location on the platform with indirect line of sight. • The measured works were located approximately 23m – 41m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M9	32-34 Campsie Street, Campsie	EWP, Handtool – grinder, Hand tools, 10T hi-rail Hydrema, 15T hi-rail excavator	68[H]	Positrack, generator, light vehicles	54	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below with the predicted noise level. This can be attributed to: • The predicted noise level included grinding activity. No grinding works were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • Observed operating plant such as light vehicles and a positrack occurred down Lillian Lane and were inaudible during the monitoring period. • The measured works were located approximately 180m – 250m away. In the prediction model, the distance between the closest work area and the most affected facade is 31m. • Observed operating plant were low impact activities and intermittent in nature.

Notes:
T: Predicted $L_{Aeq, 15min}$ for Typical activities.
H: Predicted $L_{Aeq, 15min}$ for High impact activities.
*: 5 dB penalty due to annoying characteristics.

4 Conclusion

Renzo Tonin and Associates has completed noise monitoring during the WE45 possession for Sydney Metro Southwest Station Upgrades works.

The results of the noise measurements were below the predicted noise levels as presented in the Gatewave model prepared for the works.

The difference between the measured $L_{Aeq,\ 15min}$ and the predicted noise level can be attributed to following:

- Less plant and equipment operating during the measurement compared to the modelled plants.
- Observed operational plant not operating under load for continuous durations.
- Location of the measured works were further away than the modelled works.
- Intermittent nature of the measured works.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
10.05.2023	First issue	0	1	L. Woolf	R. Zhafranata	R. Zhafranata

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APPENDIX A Monitoring locations

A.1 Dulwich Hill Station: 57A Ewart Street, 51 Ewart Lane, 67 Ewart Street

A.2 Hurlstone Park Station: 5 Railway Street, 105 Duntroon Street

A.3 Campsie Station: 13-15 Anglo Road, 2 Wilfred Avenue, 32-34 Campsie Street

APPENDIX 8 – TL927-1-42F01 2023 WK47 NOISE MONITORING REPORT

26 May 2023
TL927-1-42F01 2023 WE47 Noise Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - 2023 WE47 Possession Noise Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise monitoring during the WE47 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Out of Hours Work Application (OoHWA #35)[1] and the Gatewave model (Gatewave scenario ID: 7315) prepared for the works. This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Punchbowl, Wiley Park, Belmore, Campsie, Hurlstone Park and Dulwich Hill Stations on 20th May 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The measurement locations are listed in Table 2-1. Figures depicting the monitoring locations are included in APPENDIX A.

[1] Package 5 and Package 6: Possession works outside of standard construction hours WE47, OoHWA #35, Rev C, 15 May 2023

Table 2-1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	41 Urunga Parade, Punchbowl (Appendix A.1)	20.05.2023 01:02pm – 01:17pm	EWP (idling) and hand tools	Noise	15m	-
M2	1A Shadforth Street, Wiley Park (Appendix A.2)	20.05.2023 01:23pm – 01:38pm	Power chisel	Noise	15m–40m	-
M3	30 Redman Parade, Belmore (Appendix A.3)	20.05.2023 01:49pm – 02:04pm	Vacuum cleaner	Noise	50m	-
M4	13-15 Anglo Road, Campsie (Appendix A.4)	20.05.2023 02:15pm – 02:30pm	Generator, powered drill and hand tools	Noise	9m-50m	Noise blankets around generator on Lillian Lane. Noise blankets around drop saw on station concourse.
M5	2 Wilfred Avenue, Campsie (Appendix A.4)	20.05.2023 02:38pm – 02:53pm	Excavator and handheld hammer	Noise	30-60m	-
M6	32-34 Campsie Street, Campsie (Appendix A.4)	20.05.2023 02:55pm – 03:10pm	EWP, telehandler and excavator	Noise	35m-50m	-
M7	105 Duntroon Street, Hurlstone Park (Appendix A.5)	20.05.2023 03:39pm – 03:54pm	EWP and hand tools	Noise	5m-10m	-
M8	3A Commons Street, Hurlstone Park (Appendix A.5)	20.05.2023 04:00pm – 04:15pm	Power hand tools	Noise	40m-50m	-
M9	57A Ewart Street, Dulwich Hill (Appendix A.6)	20.05.2023 04:49pm – 05:04pm	Delivery truck, telehandler and hi-rail excavator	Noise	5m-20m	-
M10	63 Ewart Street, Dulwich Hill (Appendix A.6)	20.05.2023 05:06pm – 05:21pm	Delivery truck, hi-rail excavator and hand tools	Noise	20m	-
M11	57A Ewart Street, Dulwich Hill (Appendix A.6)	20.05.2023 06:26pm – 06:41pm	Lighting tower and excavator	Noise	20m-50m	-
M12	63 Ewart Street, Dulwich Hill (Appendix A.6)	20.05.2023 06:42pm – 06:57pm	Lighting tower and excavator	Noise	2m-15m	-

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M13	1 Ewart Lane, Dulwich Hill (Appendix A.6)	20.05.2023 08:00pm – 08:15pm	Road saw, excavator with rock hammer and handheld hammer	Noise	35m-50m	-
M14	57A Ewart Street, Dulwich Hill (Appendix A.6)	20.05.2023 08:16pm – 08:31pm	Road saw, excavator with rock hammer and grinder	Noise	40m-55m	-

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2-2 summarises the details of noise measurement equipment.

Table 2-2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	A2A-16217-E0	13 August 2021
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	301756	5 July 2022

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2-3. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2-3: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	41 Urunga Parade, Punchbowl	20.05.2023 01:02pm – 01:17pm	Clear skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 39%
M2	1A Shadforth Street, Wiley Park	20.05.2023 01:23pm – 01:38pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%
M3	30 Redman Parade, Belmore	20.05.2023 01:49pm – 02:04pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%
M4	13-15 Anglo Road, Campsie	20.05.2023 02:15pm – 02:30pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%
M5	2 Wilfred Avenue, Campsie	20.05.2023 02:38pm – 02:53pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M6	32-34 Campsie Street, Campsie	20.05.2023 02:55pm – 03:10pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%
M7	105 Duntroon Street, Hurlstone Park	20.05.2023 03:39pm – 03:54pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%
M8	3A Commons Street, Hurlstone Park	20.05.2023 04:00pm – 04:15pm	Clear skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 40%
M9	57A Ewart Street, Dulwich Hill	20.05.2023 04:49pm – 05:04pm	Clear skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 40%
M10	63 Ewart Street, Dulwich Hill	20.05.2023 05:06pm – 05:21pm	Clear skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 40%
M11	57A Ewart Street, Dulwich Hill	20.05.2023 06:26pm – 06:41pm	Clear skies; air temperature 15ºC, wind speed < 5m/s; relative humidity 39%
M12	63 Ewart Street, Dulwich Hill	20.05.2023 06:42pm – 06:57pm	Clear skies; air temperature 15ºC, wind speed < 5m/s; relative humidity 39%
M13	1 Ewart Lane, Dulwich Hill	20.05.2023 08:00pm – 08:15pm	Clear skies; air temperature 12ºC, wind speed < 5m/s; relative humidity 44%
M14	57A Ewart Street, Dulwich Hill	20.05.2023 08:16pm – 08:31pm	Clear skies; air temperature 12ºC, wind speed < 5m/s; relative humidity 44%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3-1 below.

Table 3-1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	41 Urunga Parade, Punchbowl	Hand tools (no impact), EWP and Hiab/ truck-mounted crane	65^{T}	EWP (idling) and hand tools	64	73	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. It was noted on site that the measured works were intermittent.
M2	1A Shadforth Street, Wiley Park	Hand tools (no impact) and cement mixer	55^{T}	Power chisel	55	70	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is consistent with the predicted noise level. It was noted on site that the measured works were intermittent.
M3	30 Redman Parade, Belmore	Hand tools (no impact)	50^{T}	Vacuum cleaner	61 (42)	83	No ($L_{Aeq, 15min}$)	The calculated $L_{Aeq, 15min}$ contribution from the construction works is below the predicted noise level. It was noted on site: • This monitoring location was dominated by traffic noise from Burwood Road. • The measured works were barely audible over the traffic noise.
M4	13-15 Anglo Road, Campsie	10T hi-rail Hydrema, EWP, Hand tools, Handtool – drill, Handtool – grout/hand mixer	76^{T}	Generator, powered drill and hand tools	64	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured generator was approximately 9m away and the measured hammering and drilling was approximately 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. • It was noted that the measured works excluding the generator were intermittent. • Noise blankets were installed around the generator.
M5	2 Wilfred Avenue, Campsie	10T hi-rail Hydrema, EWP, Hand tools, Handtool – drill, Handtool – grout/hand mixer	69^{T}	Excavator and handheld hammer	61	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were located approximately 30m – 60m away. In the prediction model, the distance between the closest work area and the most affected facade is 15m. • It was noted that the measured works including handheld hammering were intermittent.
M6	32-34 Campsie Street, Campsie	EWP, Hand tools, Handtool – drill, Handtool – grout/hand mixer	68^{T}	EWP, telehandler and excavator	54	76	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The measured works were located approximately 35m – 60m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m. • It was noted that the measured works were intermittent. • Telehandler operated for periods of time behind site buildings breaking line of sight to the monitoring location.
M7	105 Duntroon Street, Hurlstone Park	Mobile crane (20t-250t) EWP Handtool – drill Hand tools	81^{T}	EWP and hand tools	60	79	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were located approximately 5m-10m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. • It was noted that the measured works were intermittent.
M8	3A Commons Street, Hurlstone Park	Mobile crane (20t-250t) EWP Handtool – drill Hand tools	79^{T}	Power hand tools	61	81	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The noise generating plants were located below the monitoring location on the platform at a lower ground level than the monitoring location, with no line of sight. • The measured works were located approximately 40m – 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 10m.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M9	57A Ewart Street, Dulwich Hill	Excavator w bucket (13t) Telehandler / Franna crane Hand tools Generator Mobile crane (20t-250t) EWP Hiab Handtool – drill Roller (2t) – low vibration Compactor / Wacker packer	80^{T}	Delivery truck, telehandler and hi-rail excavator	59	87	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The delivery truck operated at a distance of 5m from the monitoring location for 2 minutes and moved to a distance of 20m away from the monitoring location. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M10	63 Ewart Street, Dulwich Hill	Excavator w bucket (13t) Telehandler / Franna crane Hand tools Generator Mobile crane (20t-250t) EWP Hiab Handtool – drill Roller (2t) – low vibration Compactor / Wacker packer	79^{T}	Delivery truck, hi-rail excavator and hand tools	51	70	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were located approximately 20m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M11	57A Ewart Street, Dulwich Hill	Excavator w bucket (13t) Telehandler / Franna crane Hand tools Generator Mobile crane (20t-250t) EWP Hiab Handtool – drill Roller (2t) – low vibration Compactor / Wacker packer	80^{T}	Lighting tower and excavator	55	67	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were located approximately 20m-50m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works including the excavator were intermittent.
M12	63 Ewart Street, Dulwich Hill	Excavator w bucket (13t) Telehandler / Franna crane Hand tools Generator Mobile crane (20t-250t) EWP Hiab Handtool – drill Roller (2t) – low vibration Compactor / Wacker packer	79^{T}	Lighting tower and excavator	68	90	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured excavator works was a passby in front of the monitoring location. The passby duration was approximately one minute and no further excavator noise was audible. • It was noted that the measured works excluding the lighting tower were intermittent.
M13	1 Ewart Lane, Dulwich Hill	Excavator w bucket (13t) Telehandler / Franna crane Hand tools Generator Mobile crane (20t-250t) EWP Hiab Handtool – drill Roller (2t) – low vibration Compactor / Wacker packer	78^{T}	Road saw, excavator with rock hammer and handheld hammer	71 (66+5)*	82	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The measured works were located approximately 35m-50m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • The measured works were located below the monitoring location on the platform at a lower ground level than the monitoring location, with no line of sight.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M14	57A Ewart Street, Dulwich Hill	Excavator w bucket (13t) Telehandler / Franna crane Hand tools Generator Mobile crane (20t-250t) EWP Hiab Handtool – drill Roller (2t) – low vibration Compactor / Wacker packer	80^{T}	Road saw, excavator with rock hammer and grinder	64 (59+5)*	75	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The measured works were located approximately 40m-55m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • The measured works were located below the monitoring location on the platform at a lower ground level than the monitoring location, with no line of sight.

Notes:
T: Predicted $L_{Aeq, 15min}$ for Typical activities.
H: Predicted $L_{Aeq, 15min}$ for High impact activities.
*: 5 dB penalty due to annoying characteristics.

4 Conclusion

Renzo Tonin and Associates has completed noise monitoring during the WE47 possession for Sydney Metro Southwest Station Upgrades works.

The results of the noise measurements were below the predicted noise levels presented in the OoHWA #35 and the Gatewave model prepared for the works.

The difference between the measured $L_{Aeq,\ 15min}$ and the predicted noise level can be attributed to following:

- Less plant and equipment operating during the measurement compared to the modelled plants.
- Observed operational plant not operating under load for continuous durations.
- Location of the measured works were further away than the modelled works.
- Intermittent nature of the measured works.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
26.05.2023	First issue	0	1	D. Auld	R. Zhafranata	R. Zhafranata

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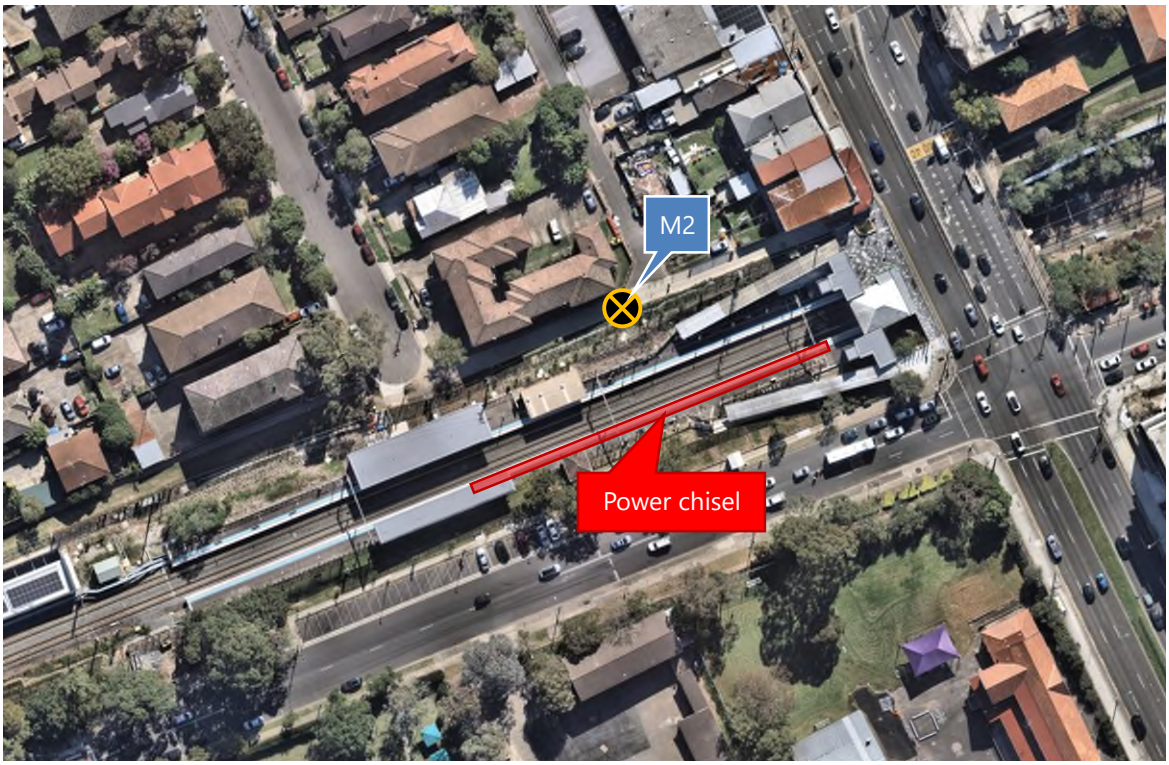
APPENDIX A Monitoring locations

A.1 Punchbowl Station: 41 Urunga Parade

A.2 Wiley Park Station: 1A Shadforth Street

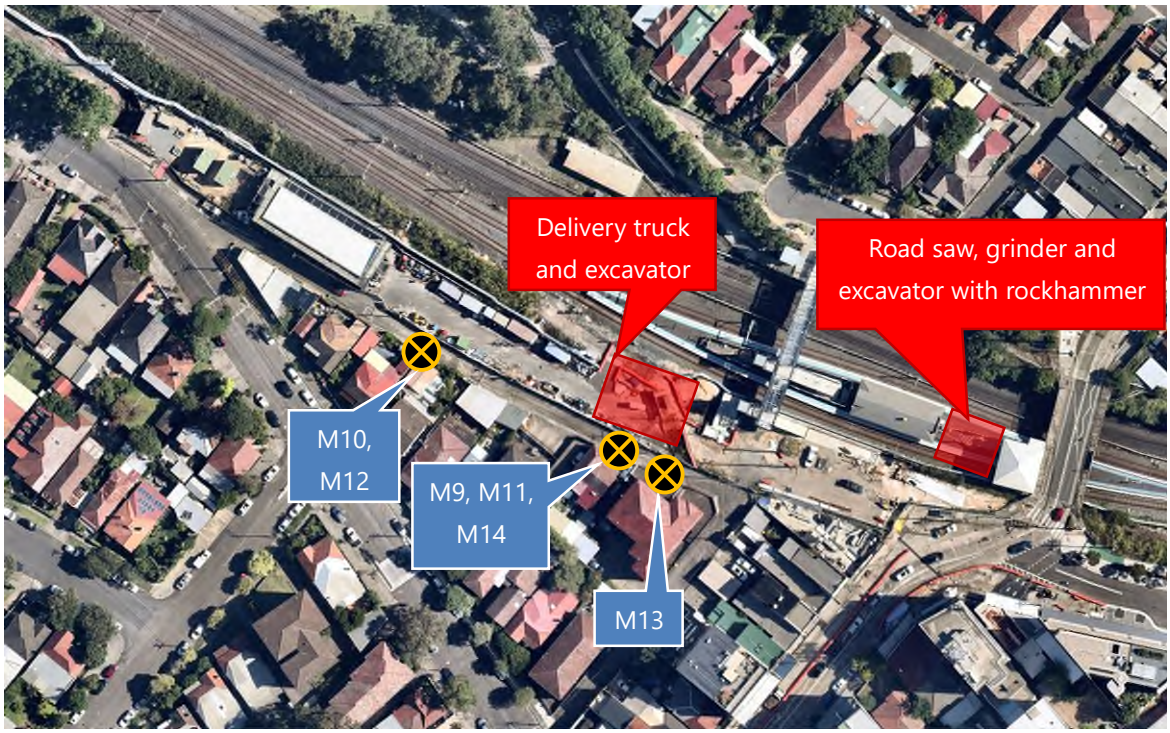


A.3 Belmore Station: 30 Redman Parade

A.4 Campsie Station: 13-15 Anglo Road, 2 Wilfred Avenue, 32-34 Campsie Street

A.5 Hurlstone Park Station: 105 Duntroon Street, 3A Commons Street

A.6 Dulwich Hill Station: 57A Ewart Street, 63 Ewart Street, 71 Ewart Street, 1 Ewart Lane



APPENDIX 9 – TL927-1-43F01 2023 JULY NOISE MONITORING REPORT

24 July 2023
TL927-1-43F01 2023 July Noise Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - 2023 July Possession Noise Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise monitoring during the July 2023 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Out of Hours Work Application (OoHWA #37)[1], OoHWA #38[2] and the Gatewave model (Gatewave scenario ID: 7621 & 7921) prepared for the works. This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Dulwich Hill, Belmore, Campsie, Hurlstone Park, Wiley Park and Dulwich Hill Stations between 8th July 2023 and 19th July 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The measurement locations are listed in Table 2-1. Figures depicting the monitoring locations are included in APPENDIX A.

[1] Package 5 and Package 6: Possession works outside of standard construction hours WE47, OoHWA #37, Rev C, 28 June 2023

[2] Package 5: Dulwich Hill waterproofing of footbridge works outside of standard construction hours, OoHWA #38, Rev C, 19 July 2023

Table 2-1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	51 Ewart Street, Dulwich Hill (Appendix A.1)	08.07.2023 12:42pm – 12:57pm	Excavator, hand tools & generator	Noise	20m	-
M2	57A Ewart Street, Dulwich Hill (Appendix A.1)	08.07.2023 01:03pm – 01:18pm	Generator	Noise	19m	-
M3	1A Shadforth Street, Wiley Park (Appendix A.2)	08.07.2023 01:56pm – 02:11pm	Hand tools, handheld pneumatic hammer & generator	Noise	15m	-
M4	1A Shadforth Street, Wiley Park (Appendix A.2)	08.07.2023 02:59pm – 03:14pm	Hand tools & handheld pneumatic hammer	Noise	15m	Noise blankets around hand tools.
M5	2 Hopetoun Street, Hurlstone Park (Appendix A.5)	08.07.2023 03:44pm – 03:59pm	Excavator & hand tools	Noise	25m	-
M6	105 Duntroon Street, Hurlstone Park (Appendix A.5)	08.07.2023 04:06pm – 04:21pm	Excavator, asphalter & Hand tools	Noise	13m	-
M7	3 Wilfred Avenue, Campsie (Appendix A.4)	08.07.2023 04:45pm – 05:00pm	Hand tools, power hand tools & generator	Noise	37m	-
M8	13-15 Anglo Road, Campsie (Appendix A.4)	08.07.2023 05:11pm – 05:26pm	Generator	Noise	13m	Noise blankets around generator on Lillian Lane.
M9	57A Ewart Street, Dulwich Hill (Appendix A.1)	09.07.2023 11:07am – 11:23am	Generator, hand tools & delivery truck	Noise	7m	-
M10	51 Ewart Street, Dulwich Hill (Appendix A.1)	09.07.2023 11:24am – 11:39am	Generator, power hand tools, excavator & delivery truck	Noise	13m	-
M11	65 Ewart Street, Dulwich Hill (Appendix A.1)	09.07.2023 11:43am – 11:58am	Generator & hand tools	Noise	15m	-
M12	46 Floss Street, Hurlstone Park (Appendix A.5)	09.07.2023 12:08pm – 12:23pm	Excavator	Noise	69m	-

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M13	105 Duntroon Street, Hurlstone Park (Appendix A.5)	09.07.2023 12:54pm – 01:09pm	Multicrane & hand tools	Noise	13m	-
M14	3 Wilfred Avenue, Campsie (Appendix A.4)	09.07.2023 01:28pm – 01:43pm	Power hand tools & excavator	Noise	40m	-
M15	32-34 Campsie Street, Campsie (Appendix A.4)	09.07.2023 01:45pm – 02:00pm	Power hand tools, hydrema & excavator	Noise	39m	-
M16	13-15 Anglo Road, Campsie (Appendix A.4)	09.07.2023 02:08pm – 02:23pm	Generator & power hand tools	Noise	13m	Noise blankets around generator on Lillian Lane.
M17	30 Redman Parade, Belmore (Appendix A.3)	09.07.2023 02:41pm – 02:56pm	Power hand tools	Noise	67m	-
M18	5 Bedford Crescent, Dulwich Hill (Appendix A.1)	13.07.2023 10:42pm – 10:57pm	Lighting tower	Noise	17m	Noise blankets around lighting tower on Bedford crescent.
M19	3 Bedford Crescent, Dulwich Hill (Appendix A.1)	13.07.2023 10:58pm – 11:13pm	Lighting tower & power hand tools	Noise	18m	Noise blankets around lighting tower on Bedford crescent.
M20	57A Ewart Street, Dulwich Hill (Appendix A.1)	15.07.2023 12:53pm – 01:08pm	Power hand tools	Noise	20m	-
M21	51 Ewart Street, Dulwich Hill (Appendix A.1)	15.07.2023 01:10pm – 01:25pm	Power hand tools	Noise	19m	-
M22	10 Dudley Street, Dulwich Hill (Appendix A.1)	15.07.2023 01:33pm – 01:48pm	Power hand tools	Noise	102m	-
M23	3 Wilfred Avenue, Campsie (Appendix A.4)	15.07.2023 02:23pm – 02:38pm	Hi-rail excavator	Noise	37m	-
M24	32-34 Campsie Street, Campsie (Appendix A.4)	15.07.2023 02:40pm – 02:55pm	Hi-rail excavator	Noise	35m	-

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M25	13-15 Anglo Road, Campsie (Appendix A.4)	15.07.2023 03:04pm – 03:19pm	Generator & hand tools	Noise	13m	Noise blankets around generator on Lillian Lane.
M26	51 Ewart Lane, Dulwich Hill (Appendix A.1)	19.07.2023 08:38pm – 08:53pm	Compressor, lighting tower (x2) (blankets fitted), truck generator	Noise	15m	Noise blankets around lighting towers only.
M27	51 Ewart Lane, Dulwich Hill (Appendix A.1)	19.07.2023 09:35pm – 09:50pm	Compressor (air valve releases), lighting tower (x2) (blankets fitted), truck generator, mixing drill	Noise	15m	Noise blankets around lighting towers and truck generator.
M28	5 Bedford Crescent, Dulwich Hill (Appendix A.1)	19.07.2023 10:16pm – 10:31pm	Lighting tower (blankets fitted)	Noise	70m	Noise blankets around lighting towers.
M29	51 Ewart Lane, Dulwich Hill (Appendix A.1)	19.07.2023 10:46pm – 11:01pm	Compressor (air valve releases), lighting tower (x2) (blankets fitted), truck generator	Noise	15m	Noise blankets around lighting towers and truck generator.

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2-2 summarises the details of noise measurement equipment.

Table 2-2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	#A2A-19156-EO	10 March 2022
Type 1 Sound Level Meter	NTi	XL2	#A2A-16821-E0	2 February 2022
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	#2162834	11 January 2023
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	#3027924	2 June 2023

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2-3. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2-3: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	51 Ewart Street, Dulwich Hill	08.07.2023 12:42pm – 12:57pm	Clear skies; air temperature 19ºC, wind speed < 5m/s; relative humidity 50%
M2	57A Ewart Street, Dulwich Hill	08.07.2023 01:03pm – 01:18pm	Clear skies; air temperature 19ºC, wind speed < 5m/s; relative humidity 50%
M3	1A Shadforth Street, Wiley Park	08.07.2023 01:56pm – 02:11pm	Clear skies; air temperature 19ºC, wind speed up to 5m/s; relative humidity 30%.
M4	1A Shadforth Street, Wiley Park	08.07.2023 02:59pm – 03:14pm	Clear skies: air temperature 19ºC, wind speed up to 5m/s; relative humidity 31%.
M5	2 Hopetoun Street, Hurlstone Park	08.07.2023 03:44pm – 03:59pm	Clear skies; air temperature 19ºC, wind speed < 5m/s; relative humidity 31%
M6	105 Duntroon Street, Hurlstone Park	08.07.2023 04:06pm – 04:21pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 33%
M7	3 Wilfred Avenue, Campsie	08.07.2023 04:45pm – 05:00pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%
M8	13-15 Anglo Road, Campsie	08.07.2023 05:11pm – 05:26pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 38%
M9	57A Ewart Street, Dulwich Hill	09.07.2023 11:07am – 11:23am	Clear skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 51%
M10	51 Ewart Street, Dulwich Hill	09.07.2023 11:24am – 11:39am	Clear skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 47%
M11	65 Ewart Street, Dulwich Hill	09.07.2023 11:43am – 11:58am	Clear skies; air temperature 19ºC, wind speed < 5m/s; relative humidity 42%
M12	46 Floss Street, Hurlstone Park	09.07.2023 12:08pm – 12:23pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 45%
M13	105 Duntroon Street, Hurlstone Park	09.07.2023 12:54pm – 01:09pm	Clear skies; air temperature 17ºC, wind speed < 5m/s; relative humidity 44%
M14	3 Wilfred Avenue, Campsie	09.07.2023 01:28pm – 01:43pm	Clear skies; air temperature 17ºC, wind speed < 5m/s; relative humidity 44%
M15	32-34 Campsie Street, Campsie	09.07.2023 01:45pm – 02:00pm	Clear skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 47%
M16	13-15 Anglo Road, Campsie	09.07.2023 02:08pm – 02:23pm	Clear skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 49%
M17	30 Redman Parade, Belmore	09.07.2023 02:41pm – 02:56pm	Clear skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 49%
M18	5 Bedford Crescent, Dulwich Hill	13.07.2023 10:42pm – 10:57pm	Clear skies; air temperature 8ºC, wind speed < 5m/s; relative humidity 37%
M19	3 Bedford Crescent, Dulwich Hill	13.07.2023 10:58pm – 11:13pm	Clear skies; air temperature 8ºC, wind speed < 5m/s; relative humidity 39%
M20	57A Ewart Street, Dulwich Hill	15.07.2023 12:53pm – 01:08pm	Clear skies; air temperature 20ºC, wind speed < 5m/s; relative humidity 43%

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M21	51 Ewart Street, Dulwich Hill	15.07.2023 01:10pm – 01:25pm	Clear skies; air temperature 20ºC, wind speed < 5m/s; relative humidity 44%
M22	10 Dudley Street, Dulwich Hill	15.07.2023 01:33pm – 01:48pm	Clear skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 47%
M23	3 Wilfred Avenue, Campsie	15.07.2023 02:23pm – 02:38pm	Clear skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 49%
M24	32-34 Campsie Street, Campsie	15.07.2023 02:40pm – 02:55pm	Clear skies; air temperature 20ºC, wind speed < 5m/s; relative humidity 46%
M25	13-15 Anglo Road, Campsie	15.07.2023 03:04pm – 03:19pm	Clear skies; air temperature 19ºC, wind speed < 5m/s; relative humidity 45%
M26	51 Ewart Lane, Dulwich Hill	19.07.2023 08:38pm – 08:53pm	Clear skies; air temperature 7ºC, wind speed < 5m/s; relative humidity 90%
M27	51 Ewart Lane, Dulwich Hill	19.07.2023 09:35pm – 09:50pm	Clear skies; air temperature 7ºC, wind speed < 5m/s; relative humidity 90%
M28	5 Bedford Crescent, Dulwich Hill	19.07.2023 10:16pm – 10:31pm	Clear skies; air temperature 6ºC, wind speed < 5m/s; relative humidity 90%
M29	51 Ewart Lane, Dulwich Hill	19.07.2023 10:46pm – 11:01pm	Clear skies; air temperature 6ºC, wind speed < 5m/s; relative humidity 87%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3-1 below.

Table 3-1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	51 Ewart Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	88[H]	Excavator, hand tools & generator	57	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 20m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. • It was noted that the measured works excluding the generator were intermittent.
M2	57A Ewart Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	87[H]	Generator	57	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 19m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m.
M3	1A Shadforth Street, Wiley Park	Handtools and cement mixer	55[T]	Hand tools, handheld pneumatic hammer & generator	70	82	Yes ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is above the predicted noise level. This can be attributed to: • Wiley Park predictions were modelled using the TfNSW model. This included hand tools (no impact) and a cement mixer, However it did not include the handheld pneumatic hammer which was used on site. • Noise blankets were in the process of being installed throughout the measurement period.
M4	1A Shadforth Street, Wiley Park	Handtools and cement mixer	55[T]	Hand tools & handheld pneumatic hammer	65	78	Yes ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is above the predicted noise level. This can be attributed to: • Wiley Park predictions were modelled using the TfNSW model. This included hand tools (no impact) and a cement mixer, However it did not include the handheld pneumatic hammer which was used on site. • Noise blankets were installed; however, it is recommended that they should be installed vertically as opposed to horizontally. • It was noted on site that the existing platform building was partially shielding the works.
M5	2 Hopetoun Street, Hurlstone Park	Hand tools, grout mixer, EWP, delivery trucks, concrete saw, compactor, forklift, jackhammer, 15t hi-rail excavator and rattle gun	70[H]	Excavator & hand tools	55	73	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 3m. • It was noted that the measured works were intermittent.
M6	105 Duntroon Street, Hurlstone Park	Hand tools, grout mixer, EWP, delivery trucks, concrete saw, compactor, forklift, jackhammer, 15t hi-rail excavator and rattle gun	81[H]	Excavator, asphalter & Hand tools	62	86	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. • It was noted that the measured works were intermittent.
M7	3 Wilfred Avenue, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	65[T]	Hand tools, power hand tools & generator	61	91	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 37m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works excluding the generator were intermittent.
M8	13-15 Anglo Road, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	74[T]	Generator	64	76	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. • Noise blankets were installed around the generator.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M9	57A Ewart Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	87[H]	Generator, hand tools & delivery truck	60	82	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 37m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. • It was noted that the measured works excluding the generator were intermittent.
M10	51 Ewart Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	84[H]	Generator, power hand tools, excavator & delivery truck	62	80	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 7m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. • It was noted that the measured works excluding the generator were intermittent.
M11	65 Ewart Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	86[H]	Generator & hand tools	58	79	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. • It was noted that the measured works excluding the generator were intermittent.
M12	46 Floss Street, Hurlstone Park	Hand tools, grout mixer, EWP, delivery trucks, concrete saw, compactor, forklift, jackhammer, 15t hi-rail excavator and rattle gun	73[H]	Excavator	56	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 69m away. In the prediction model, the distance between the closest work area and the most affected facade is 9m. • It was noted that the measured works were intermittent.
M13	105 Duntroon Street, Hurlstone Park	Hand tools, grout mixer, EWP, delivery trucks, concrete saw, compactor, forklift, jackhammer, 15t hi-rail excavator and rattle gun	81[H]	Multicrane & hand tools	61	87	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. • It was noted that the measured works were intermittent.
M14	3 Wilfred Avenue, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	65[T]	Power hand tools & excavator	63	90	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M15	32-34 Campsie Street, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	65[T]	Power hand tools, hydrema & excavator	61	87	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 39m away. In the prediction model, the distance between the closest work area and the most affected facade is 9m. • It was noted that the measured works were intermittent.
M16	13-15 Anglo Road, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	74[T]	Generator & power hand tools	62	79	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. • It was noted that the measured works excluding the generator were intermittent. • Noise blankets were installed around the generator.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M17	30 Redman Parade, Belmore	Handtools	50[T]	Power hand tools	63(50)[1]	83	No ($L_{Aeq, 15min}$)	The calculated $L_{Aeq, 15min}$ contribution from the measured works is consistent with the predicted noise level. The following notes were taken during the measurement: • Road traffic on Burwood Road was the dominating noise source during this measurement. • The measured works were barely audible over the constant road traffic on Burwood Road. • The measured works were intermittent.
M18	5 Bedford Crescent, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer	62[T]	Lighting tower	51	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 17m away. In the prediction model, the distance between the closest work area and the most affected facade is 11m. • Noise blankets were installed around the lighting tower.
M19	3 Bedford Crescent, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer	61[T]	Lighting tower & power hand tools	58	82	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 18m away. In the prediction model, the distance between the closest work area and the most affected facade is 8m. • It was noted that the measured works excluding the lighting tower were intermittent. • Noise blankets were installed around the lighting tower.
M20	57A Ewart Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	87[H]	Power hand tools	62	80	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 20m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. • It was noted that the measured works were intermittent.
M21	51 Ewart Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	84[H]	Power hand tools	64	77	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 19m away. In the prediction model, the distance between the closest work area and the most affected facade is 4m. • It was noted that the measured works were intermittent.
M22	10 Dudley Street, Dulwich Hill	Compressor, generator, hand tools, EWP, 5t excavator with bucket attachment, 20t franna crane, power hand tools, hiab, grout mixer and concrete saw	70[H]	Power hand tools	62	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 102m away. In the prediction model, the distance between the closest work area and the most affected facade is 19m. • It was noted that the measured works were intermittent.
M23	3 Wilfred Avenue, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	65[T]	Hi-rail excavator	54	69	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 37m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M24	32-34 Campsie Street, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	65[T]	Hi-rail excavator	54	77	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 35m away. In the prediction model, the distance between the closest work area and the most affected facade is 9m. • It was noted that the measured works were intermittent.
M25	13-15 Anglo Road, Campsie	15t hi-rail excavator, EWP, hi-rail flatbed truck, forklift, hand tools and power hand tools	74[T]	Generator & hand tools	60	82	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 13m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. • It was noted that the measured works excluding the generator were intermittent. • Noise blankets were installed around the generator.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M26	51 Ewart Lane, Dulwich Hill	Compressor with 10dB(A) reduction, generator with 10dB(A) reduction, lighting tower with 10dB(A) reduction	53	Compressor, lighting tower (x2) (blankets fitted), truck generator	61	77	Yes ($L_{Aeq, 15min}$), see comments	The measured $L_{Aeq, 15min}$ is above the predicted noise level. This can be attributed to: • Different plant and equipment operating during the measurement compared to the modelled prediction. • Compressor and truck generator were not fitted with noise blankets. • The following particular site sources were noted during the monitoring period: o Truck generator and compressor operating: 60-61 dB(A) during steady operation. o Compressor cycling and generator operating: 61-62 dB(A), compressor cycled for 2.5 minutes over 15 minute period. o Ambient noise environment was influenced by constant operational noise from the truck generator and compressor. • It is noted that without the 10dB(A) reduction in the modelled prediction, the measured $L_{Aeq, 15min}$ is expected to be 2 dB(A) less than the predicted noise level. • Subsequent to the measurement, the site engineer instructed to install noise blankets around the truck generator to potentially reduce the noise source.
M27	51 Ewart Lane, Dulwich Hill	Compressor with 10dB(A) reduction, generator with 10dB(A) reduction, lighting tower with 10dB(A) reduction	53	Compressor (air valve releases), lighting tower (x2) (blankets fitted), truck generator, mixing drill	63	78	Yes ($L_{Aeq, 15min}$), see comments	The measured $L_{Aeq, 15min}$ is above the predicted noise level. This can be attributed to: • Different plant and equipment operating during the measurement compared to the modelled prediction. • Compressor was not fitted with noise blankets as the noise source was approximately 2.5m above ground level and deemed not feasible. • The following particular site sources were noted during the monitoring period: o Noise blankets were installed around the truck generator noise source. o Truck generator and compressor operating: 59-60 dB(A) during steady operation. o Compressor cycling and generator operating: 60-61 dB(A), compressor cycled for 2.5 minutes over 15 minute period. o Air valve releases: 71-73 dB(A), air releases occurred for 7.5 minutes over 15 minute period. o Air valve releases and mixing drill: 71-74 dB(A). o The fitted noise blankets were observed to provide a 1 dB(A) reduction at the monitoring location. Higher measured $L_{Aeq, 15min}$ during this measurement compared to M26 measurement can be attributed to air valve releases from the compressor. o Ambient noise environment was influenced by constant operational noise from the truck generator and compressor, As well as releases from the air valve. • It is noted that without the 10dB(A) reduction in the modelled prediction, the measured $L_{Aeq, 15min}$ is expected to be consistent with the predicted noise level. • After the measurement, the site engineer discussed with the site supervisor and work crew possible feasible and reasonable noise mitigation strategies. It was explained to the site engineer that it was not possible to immediately stop works. The site engineer instructed the work crew and site supervisor to orientate the truck containing the generator and compressor away from residences where feasible during the works and that noise blankets were to be fitted around the truck generator in all work areas.
M28	5 Bedford Crescent, Dulwich Hill	Compressor with 10dB(A) reduction, generator with 10dB(A) reduction, lighting tower with 10dB(A) reduction	57	Lighting tower (blankets fitted)	52	64	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • Only a lighting tower with noise blankets was operating near the monitoring location during this measurement. • The following particular site source was noted during the monitoring period: o Lighting tower with noise blankets operating: 50-51 dB(A) steady operation.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M29	51 Ewart Lane, Dulwich Hill	Compressor with 10dB(A) reduction, generator with 10dB(A) reduction, lighting tower with 10dB(A) reduction	53	Compressor (air valve releases), lighting tower (x2) (blankets fitted), truck generator	62	77	Yes ($L_{Aeq, 15min}$), see comments	This measurement was conducted in response to a complaint received by the site supervisor from a resident in 51 Ewart Lane, Dulwich Hill. The measured $L_{Aeq, 15min}$ is above the predicted noise level. This can be attributed to: • Different plant and equipment operating during the measurement compared to the modelled prediction. • Compressor was not fitted with noise blankets as the noise source was approximately 2.5m above ground level and deemed not feasible. • The following particular site sources were noted during the monitoring period: o Noise blankets were installed around the truck generator noise source. o Truck generator and compressor operating: 59-60 dB(A) during steady operation. o Compressor cycling and generator operating: 60-61 dB(A), compressor cycled for 2.5 minutes over 15 minute period. o Air valve releases: 70-76 dB(A) air releases occurred for 5.5 minutes over 15 minute period. o The fitted noise blankets were observed to provide a 1 dB(A) reduction at the monitoring location. Higher measured $L_{Aeq, 15min}$ during this measurement compared to M26 measurement can be attributed to air valve releases from the compressor. o Ambient noise environment was influenced by constant operational noise from the truck generator and compressor, As well as releases from the air valve. • It is noted that without the 10dB(A) reduction in the modelled prediction, the measured $L_{Aeq, 15min}$ is expected to be 1 dB(A) less than the predicted noise level.

Notes:

T: Predicted $L_{Aeq, 15min}$ for Typical activities.

H: Predicted $L_{Aeq, 15min}$ for High impact activities.

*: 5 dB penalty due to annoying characteristics.

1. Calculated measured contribution from construction works.

4 Conclusion

Renzo Tonin and Associates has completed noise monitoring during the July 2023 possession for Sydney Metro Southwest Station Upgrades works.

The results of the noise measurements were below the predicted noise levels presented in the OoHWA #37, OoHWA #38 and the Gatewave models prepared for the works except for measurement M3, M4, M26, M27 and M29. The cause of exceedance compared to the corresponding predicted noise levels are included in the comments section.

The difference between the measured $L_{Aeq, 15min}$ and the predicted noise level can be attributed to following:

- Less plant and equipment operating during the measurement compared to the modelled plants.
- Plant and equipment used on site not being included in the model.
- Observed operational plant not operating under load for continuous durations.
- Location of the measured works were further away than the modelled works.
- Intermittent nature of the measured works.
- The use of noise blankets on site; note that noise blankets shall be installed vertically.

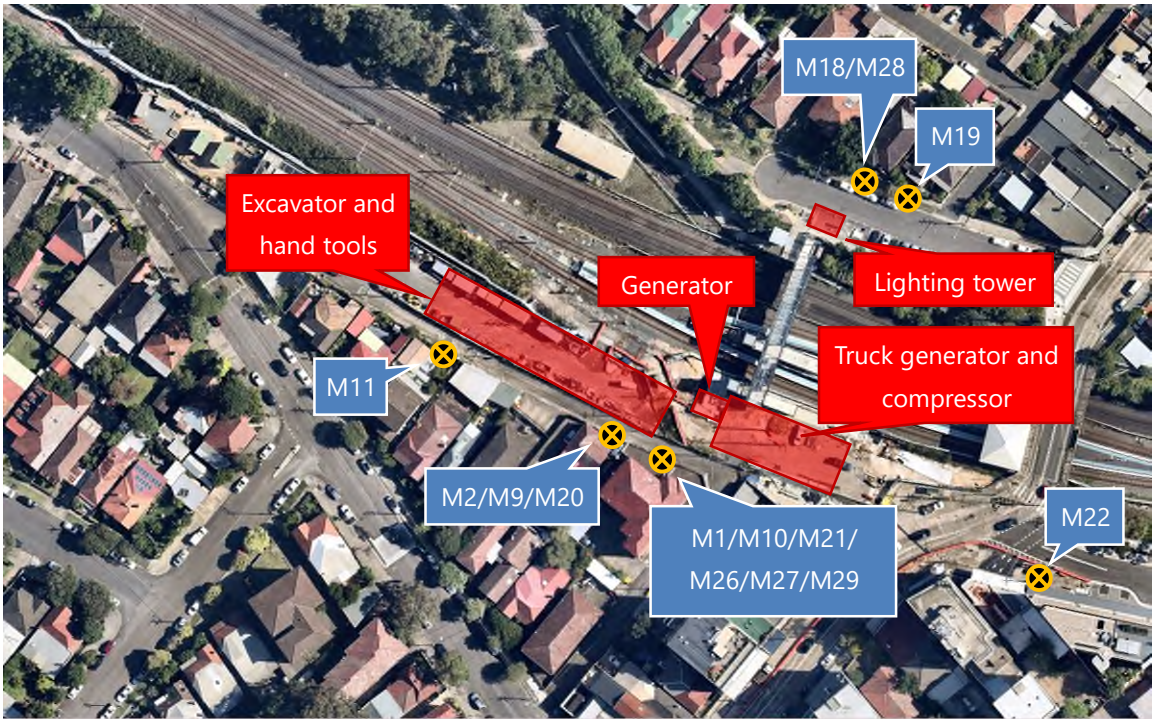
Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
24.07.2023	First issue	0	1	A. Hannelly	R. Zhafranata	R. Zhafranata

File Path: R:\AssocSydProjects\TL901-TL950\TL927 Southwest Metro - Stations Upgrades\1 Docs\43 July 2023 Noise Monitoring\TL927-1-43F01 2023 July Noise Monitoring Report (r1).docx

APPENDIX A Monitoring locations

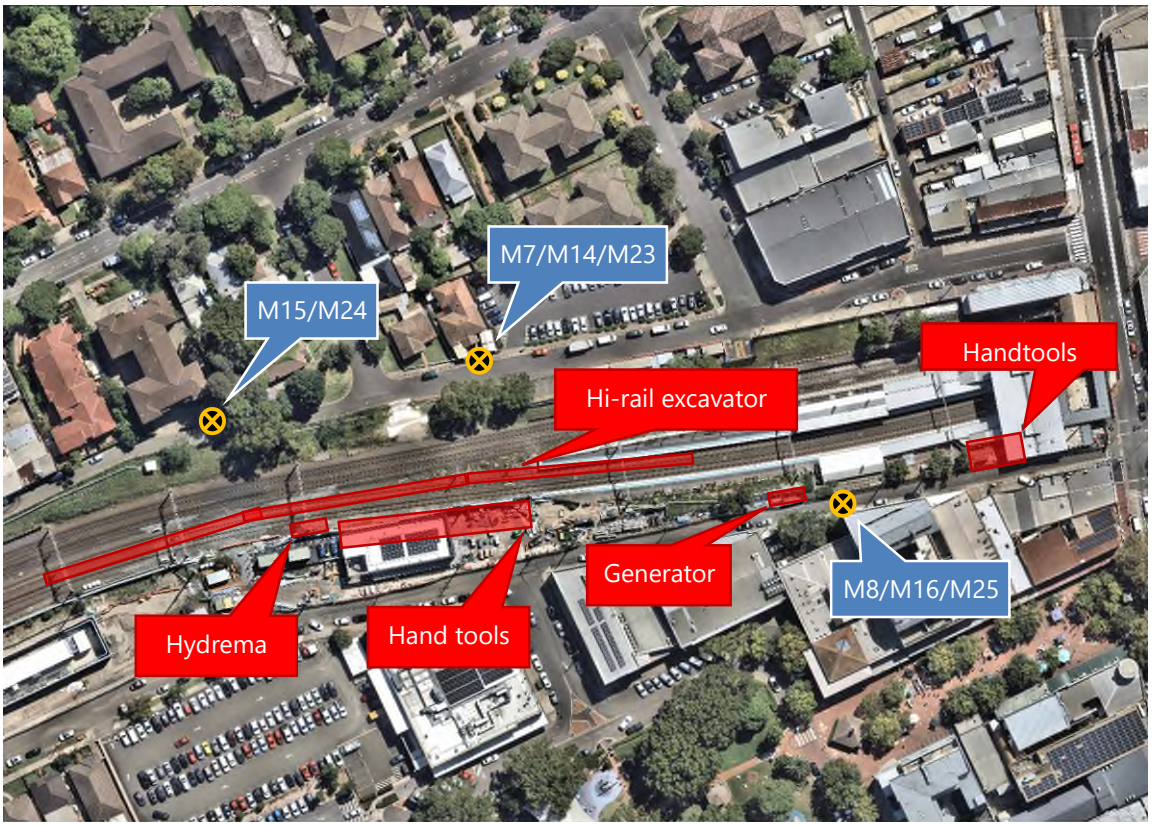
A.1 Dulwich Hill Station: 3 Bedford Crescent, 5 Bedford Crescent, 51 Ewart Street, 57A Ewart Street, 65 Ewart Street & 10 Dudley Street



A.2 Wiley Park Station: 1A Shadforth Street

A.3 Belmore Station: 30 Redman Parade

A.4 Campsie Station: 13-15 Anglo Road, 3 Wilfred Avenue, 32-34 Campsie Street



A.5 Hurlstone Park Station: 105 Duntroon Street, 3A Commons Street & 46 Floss Street

APPENDIX 10 – TL927-1-44F01 2023 WE09 NOISE AND VIBRATION MONITORING REPORT

4 September 2023
TL927-1-44F01 WE09 Noise and Vibration Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - WE09 Noise and Vibration Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise and vibration monitoring during the WE09 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model (Gatewave scenario ID: 8002) prepared for the works. The vibration monitoring was undertaken to monitor potentially affected structures. This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Wiley Park, Hurlstone Park and Dulwich Hill Stations on 26th August 2023. Unattended vibration monitoring was undertaken at Dulwich Hill Station between 26th August 2023 and 28th August 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The unattended vibration measurement was conducted within the station concourse at Dulwich Hill Station. The measurement locations are listed in Table 2-1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2-1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	2 Shadforth Street, Wiley Park (Appendix A.1)	26.08.2023 09:16am – 09:31am	Power hand tools	Noise	100m	-
M2	1-3 Shadforth Street, Wiley Park (Appendix A.1)	26.08.2023 09:35am – 09:50am	Power hand tools and light vehicles	Noise	40m	-
M3	2/1 Cornelia Street, Wiley Park (Appendix A.1)	26.08.2023 09:53am – 10:08am	Power hand tools	Noise	150m	-
M4	105 Duntroon Street, Hurlstone Park (Appendix A.2)	26.08.2023 10:32am – 09:47am	Generator, power hand tools and EWP	Noise	15m	-
M5	107 Duntroon Street, Hurlstone Park (Appendix A.2)	26.08.2023 10:48am – 11:03am	Generator and power hand tools	Noise	35m	-
M6	109 Duntroon Street, Hurlstone Park (Appendix A.2)	26.08.2023 11:06am – 11:21am	Generator and power hand tools	Noise	50m	-
M7	71 Ewart Street, Dulwich Hill (Appendix A.3)	26.08.2023 11:31am – 11:46am	Power/non-power hand tools, delivery trucks and excavator	Noise	2m-30m	-
M8	67-69 Ewart Street, Dulwich Hill (Appendix A.3)	26.08.2023 11:48am – 12:03pm	Power/non-power hand tools, delivery trucks and EWP	Noise	25m	-
M9	57A Ewart Street, Dulwich Hill (Appendix A.3)	26.08.2023 12:05pm – 12:20pm	Power/non-power hand tools, delivery trucks, EWP, excavator and concrete agi	Noise	5m	-
M10	Dulwich Hill Station concourse (Appendix A.3)	26.08.2023 – 28.08.2023 08:30am – 11:30am	Generator, power hand tools, excavator & delivery truck	Vibration	5m-10m	-

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2-2 summarises the details of noise measurement equipment.

Table 2-2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	#A2A-20131-E0	10 March 2022
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	#3000809	12 January 2023

The instrumentation used for the vibration measurement are summarised in Table 2-3. The transducers used in the measurements have current calibration certificates. For monitoring on hard surfaces (e.g. asphalt), in accordance with AS 2775-2004[1], the surface was brushed to displace any dirt and the transducers were attached to the surface using double sided adhesive tape.

Table 2-3: Summary of vibration instrumentation

Type	Make / Model
Triaxial Transducers	Sigicom C12 (SN: 66890)

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2-4. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2-4: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	2 Shadforth Street, Wiley Park	26.08.2023 09:16am – 09:31am	Cloudy skies; air temperature 15ºC, wind speed < 5m/s; relative humidity 69%
M2	1-3 Shadforth Street, Wiley Park	26.08.2023 09:35am – 09:50am	Cloudy skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 69%
M3	2/1 Cornelia Street, Wiley Park	26.08.2023 09:53am – 10:08am	Cloudy skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 69%
M4	105 Duntroon Street, Hurlstone Park	26.08.2023 10:32am – 09:47am	Cloudy skies; air temperature 18ºC, wind speed < 5m/s; relative humidity 66%

[1] Australia Standard 2775-2004 Mechanical vibration and shock – Mechanical mounting of accelerometers

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M5	107 Duntroon Street, Hurlstone Park	26.08.2023 10:48am – 11:03am	Cloudy skies; air temperature 19ºC, wind speed < 5m/s; relative humidity 66%
M6	109 Duntroon Street, Hurlstone Park	26.08.2023 11:06am – 11:21am	Cloudy skies; air temperature 19ºC, wind speed < 5m/s; relative humidity 66%
M7	71 Ewart Street, Dulwich Hill	26.08.2023 11:31am – 11:46am	Cloudy skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 60%
M8	67-69 Ewart Street, Dulwich Hill	26.08.2023 11:48am – 12:03pm	Cloudy skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 60%
M9	57A Ewart Street, Dulwich Hill	26.08.2023 12:05pm – 12:20pm	Cloudy skies; air temperature 21ºC, wind speed < 5m/s; relative humidity 60%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3-1 below.

Table 3-1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	2 Shadforth Street, Wiley Park	Excavator w bucket (13t) and hand tools	69[T]	Power hand tools	48	64	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 100m away. In the prediction model, the distance between the closest work area and the most affected facade is 25m. • It was noted that the measured works were intermittent.
M2	1-3 Shadforth Street, Wiley Park	Excavator w bucket (13t) and hand tools	73[T]	Power hand tools and light vehicles	54	67	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 20m. • It was noted that the measured works were intermittent.
M3	2/1 Cornelia Street, Wiley Park	Excavator w bucket (13t) and hand tools	68[T]	Power hand tools	46	64	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 150m away. In the prediction model, the distance between the closest work area and the most affected facade is 35m. • It was noted that the measured works were intermittent.
M4	105 Duntroon Street, Hurlstone Park	Hand tools, EWP, 15T hi-rail excavator	81[T]	Generator, power hand tools and EWP	62	75	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works excluding the generator were intermittent. • It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.
M5	107 Duntroon Street, Hurlstone Park	Hand tools, EWP, 15T hi-rail excavator	76[T]	Generator and power hand tools	62	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 35m away. In the prediction model, the distance between the closest work area and the most affected facade is 25m. • It was noted that the measured works excluding the generator were intermittent. • It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.
M6	109 Duntroon Street, Hurlstone Park	Hand tools, EWP, 15T hi-rail excavator	75[T]	Generator and power hand tools	56	75	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 40m. • It was noted that the measured works excluding the generator were intermittent. • It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.
M7	71 Ewart Street, Dulwich Hill	Hand tools, EWP, 15T hi-rail excavator, concrete pump, concrete truck, delivery truck, excavator w bucket (13t), hiab, generator, compressor, telehandler, concrete saw, 10T hi-rail hydrema and jackhammer	89[H]	Power/non-power hand tools, delivery trucks and excavator	65	88	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works excluding the delivery truck were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured were intermittent.
M8	67-69 Ewart Street, Dulwich Hill	Hand tools, EWP, 15T hi-rail excavator, concrete pump, concrete truck, delivery truck, excavator w bucket (13t), hiab, generator, compressor, telehandler, concrete saw, 10T hi-rail hydrema and jackhammer	86[H]	Power/non-power hand tools, delivery trucks and EWP	62	92	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works excluding the delivery truck were approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured were intermittent.

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M9	57A Ewart Street, Dulwich Hill	Hand tools, EWP, 15T hi-rail excavator, concrete pump, concrete truck, delivery truck, excavator w bucket (13t), hiab, generator, compressor, telehandler, concrete saw, 10T hi-rail hydrema and jackhammer	86[H]	Power/non-power hand tools, delivery trucks, EWP, excavator and concrete agi	70	87	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The predicted noise level included high impact activity. No high impact activities were occurring during this measurement. • Less plant and equipment operating during the measurement compared to the modelled prediction. • It was noted that the measured were intermittent.

Notes:
T: Predicted $L_{Aeq, 15min}$ for Typical activities.
H: Predicted $L_{Aeq, 15min}$ for High impact activities.

4 Vibration Monitoring results

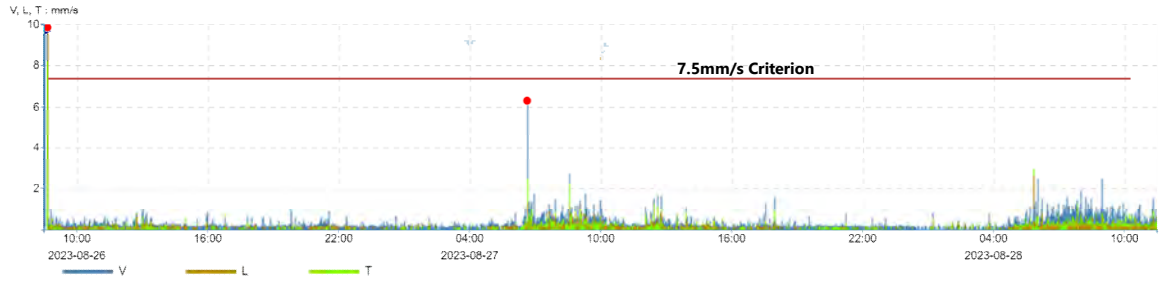
4.1 Dulwich Hill Station vibration monitoring

In accordance with the Noise and Vibration Management Plan[2], the applicable vibration screening criterion for cosmetic damage is as follows:

- Heritage structures (structurally sound): 7.5 mm/s

The results of the unattended vibration measurements for Dulwich Hill Station are presented in Figure 4-1.

Figure 4-1: Unattended vibration monitoring at Dulwich Hill Station (refer to Appendix A.3)



It can be seen in Figure 4-1, except for one instance (installation of the monitor), the vibration levels produced from the vibration intensive works in the proximity of the station concourse are below 7.5mm/s criterion.

5 Conclusion

Renzo Tonin and Associates has completed noise and vibration monitoring during the WE09 possession for Sydney Metro Southwest Station Upgrades works.

The results of the noise measurements were below the predicted noise levels presented in the Gatewave model prepared for the works.

The results of the unattended vibration measurement were below the relevant vibration criterion.

[2] Southwest Metro – Dulwich Hill, Campsie and Punchbowl Station Upgrades Noise and Vibration Management Plan, version Rev06, Review date: 13 May 2022

Document control

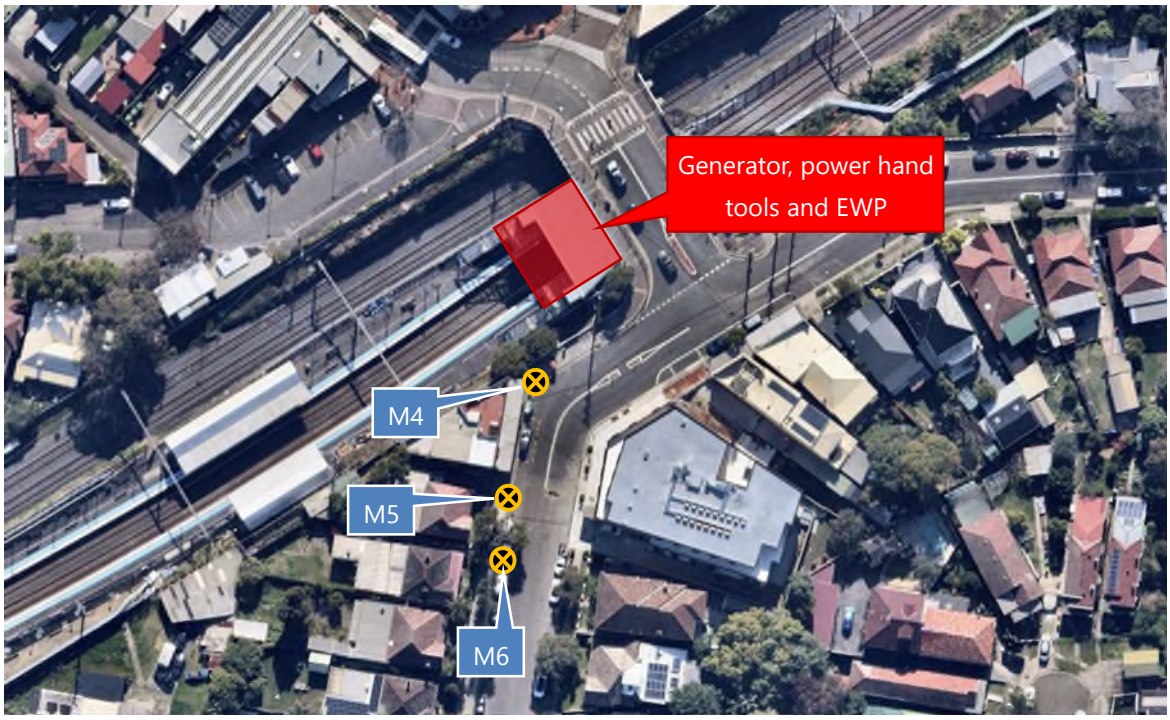
Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
04.09.2023	First issue	0	1	D. Auld	R. Zhafranata	R. Zhafranata

File Path: R:\AssocSydProjects\TL901-TL950\TL927 Southwest Metro - Stations Upgrades\1 Docs\44 26.08.2023 WE09 Noise and Vibration Monitoring\TL927-1-44F01 WE09 Noise and Vibration Monitoring Report (r1).docx

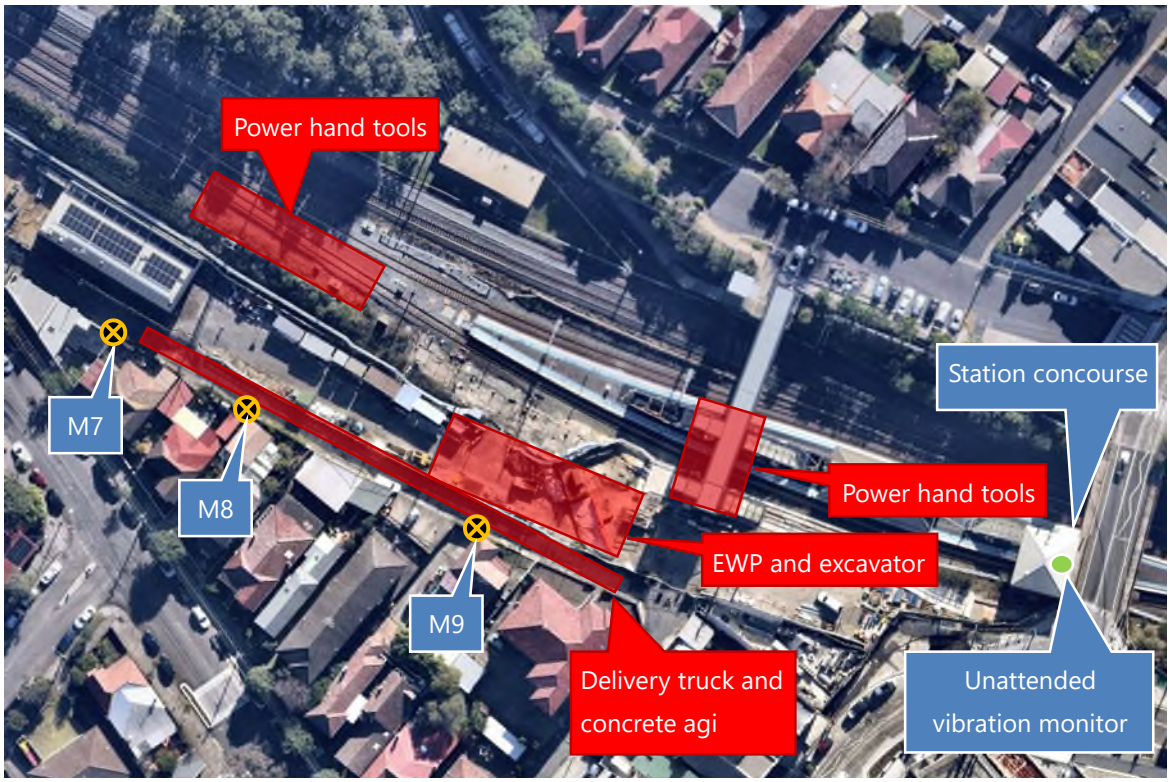
APPENDIX A Monitoring locations

A.1 Wiley Park Station: 2 Shadforth Street, 1-3 Shadforth Street, 2/1 Cornelia Street

A.2 Hurlstone Park Station: 105 Duntroon Street, 107 Duntroon Street, 109 Duntroon Street



A.3 Dulwich Hill Station: 71 Ewart Street, 67-69 Ewart Street, 57A Ewart Street



APPENDIX 11 – TL927-1-45F01 2023 WE13 NOISE AND VIBRATION MONITORING REPORT

28 September 2023
TL927-1-45F01 WE13 Noise and Vibration Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - WE13 Noise and Vibration Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise and vibration monitoring during the WE13 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model (Gatewave scenario ID: 8314) prepared for the works. The vibration monitoring was undertaken to monitor potentially affected structures. This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Hurlstone Park and Dulwich Hill Stations on 23rd September 2023. Unattended vibration monitoring was undertaken at Dulwich Hill Station between 23rd September 2023 and 24th September 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The unattended vibration measurement was conducted within the station building on the Dulwich Hill Station platform. The measurement locations are listed in Table 2.1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2.1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	105 Duntroon Street, Hurlstone Park (Appendix A.1)	23.09.2023 09:14am - 09:29am	Non-powered handtools, excavator with bucket and light vehicles	Noise	25m	-
M2	107 Duntroon Street, Hurlstone Park (Appendix A.1)	23.09.2023 09:30am - 09:45am	EWP, excavator with bucket and non-powered and power handtools	Noise	45m	-
M3	6 Hopetoun Street, Hurlstone Park (Appendix A.1)	23.09.2023 09:59am - 10:14am	Vacuum truck, excavator with bucket	Noise	35m	-
M4	7 Bedford Crescent, Dulwich Hill (Appendix A.2)	23.09.2023 10:34am - 10:49am	Generator, flat bed truck with crane arm, grinder and excavator with bucket	Noise	50m	-
M5	244 Wardell Road, Dulwich Hill (Appendix A.2)	23.09.2023 10:54am - 11:09am	Excavator with bucket, non-powered handtools and flat bed truck with crane arm	Noise	50m	-
M6	51 Ewart Lane, Dulwich Hill (Appendix A.2)	23.09.2023 11:14am - 11:29am	Excavator with bucket, flat bed truck with crane arm, plate compactor and bench saw	Noise	7m	-
M7	Dulwich Hill platform station building	23.09.2023 – 24.09.2023 08:30am – 02:00pm	Power hand tools	Vibration	1-5m	-

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2.2 summarises the details of noise measurement equipment.

Table 2.2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	#A2A-16217-E0	4 August 2023
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	#3009707	17 January 2023

The instrumentation used for the vibration measurement are summarised in Table 2.3. The transducers used in the measurements have current calibration certificates. For monitoring on hard surfaces (e.g. asphalt), in accordance with AS 2775-2004[1], the surface was brushed to displace any dirt and the transducers were attached to the surface using double sided adhesive tape.

Table 2.3: Summary of vibration instrumentation

Type	Make / Model
Triaxial Transducers	Sigicom C22 (SN: 102478)

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2.4. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2.4: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	105 Duntroon Street, Hurlstone Park	23.09.2023 09:14am - 09:29am	Overcast skies; air temperature 15ºC, wind speed < 5m/s; relative humidity 65%
M2	107 Duntroon Street, Hurlstone Park	23.09.2023 09:30am - 09:45am	Cloudy skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 65%
M3	6 Hopetoun Street, Hurlstone Park	23.09.2023 09:59am - 10:14am	Cloudy skies; air temperature 17ºC, wind speed < 5m/s; relative humidity 68%

[1] Australia Standard 2775-2004 Mechanical vibration and shock – Mechanical mounting of accelerometers

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M4	7 Bedford Crescent, Dulwich Hill	23.09.2023 10:34am - 10:49am	Cloudy skies; air temperature 16ºC, wind speed < 5m/s; relative humidity 69%
M5	244 Wardell Road, Dulwich Hill	23.09.2023 10:54am - 11:09am	Cloudy skies; air temperature 17ºC, wind speed < 5m/s; relative humidity 70%
M6	51 Ewart Lane, Dulwich Hill	23.09.2023 11:14am - 11:29am	Cloudy skies; air temperature 20ºC, wind speed < 5m/s; relative humidity 72%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3.1.

Table 3.1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	105 Duntroon Street, Hurlstone Park	Power hand tool, telehandler, EWP and piling rig - bored	75[T]	Non-powered handtools, excavator with bucket and light vehicles	58	76	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 25m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • Works were undertaken within the station concourse which provided shielding to the monitoring location. • It was noted that the measured works were intermittent.
M2	107 Duntroon Street, Hurlstone Park	Power hand tool, telehandler, EWP and piling rig - bored	72[T]	EWP, excavator with bucket and non-powered and power handtools	59	75	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 45m away. In the prediction model, the distance between the closest work area and the most affected facade is 30m. • Works were undertaken within the station concourse which provided shielding to the monitoring location. • It was noted that the measured works were intermittent.
M3	6 Hopetoun Street, Hurlstone Park	Power hand tool, telehandler, EWP and piling rig - bored	75[T]	Vacuum truck, excavator with bucket	63	81	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 35m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M4	7 Bedford Crescent, Dulwich Hill	EWP, lighting tower, hand tools, delivery trucks, excavator w bucket (13t), Hiab, 10T hi-rail hydrema, compactor, concrete cutting saw, jackhammer, generator, truck and dog and telehandler	83[H]	Generator, flat bed truck with crane arm, grinder and excavator with bucket	61 (56+5) inclusive of 5dB penalty due to grinding	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • The measured works were approximately 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 35m. • It was noted that the measured works excluding the generator were intermittent. • It was noted that the generator was located at a lower ground level than the measurement location causing the generator to be shielded.
M5	244 Wardell Road, Dulwich Hill	EWP, lighting tower, hand tools, delivery trucks, excavator w bucket (13t), Hiab, 10T hi-rail hydrema, compactor, concrete cutting saw, jackhammer, generator, truck and dog and telehandler	85[H]	Excavator with bucket, non-powered handtools and flat bed truck with crane arm	67	78	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact plants were used during the monitoring period. • The measured works were approximately 50m away. In the prediction model, the distance between the closest work area and the most affected facade is 30m. • It was noted that the measured works were intermittent.
M6	51 Ewart Lane, Dulwich Hill	EWP, lighting tower, hand tools, delivery trucks, excavator w bucket (13t), Hiab, 10T hi-rail hydrema, compactor, concrete cutting saw, jackhammer, generator, truck and dog and telehandler	83[H]	Excavator with bucket, flat bed truck with crane arm, plate compactor and bench saw	71 (66+5) inclusive of 5dB penalty due to bench sawing	81	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • It was noted that the measured works were intermittent. • It was noted that the bench saw location had no line of sight to the monitoring location.

Notes:
T: Predicted $L_{Aeq, 15min}$ for Typical activities.
H: Predicted $L_{Aeq, 15min}$ for High impact activities.

4 Vibration Monitoring results

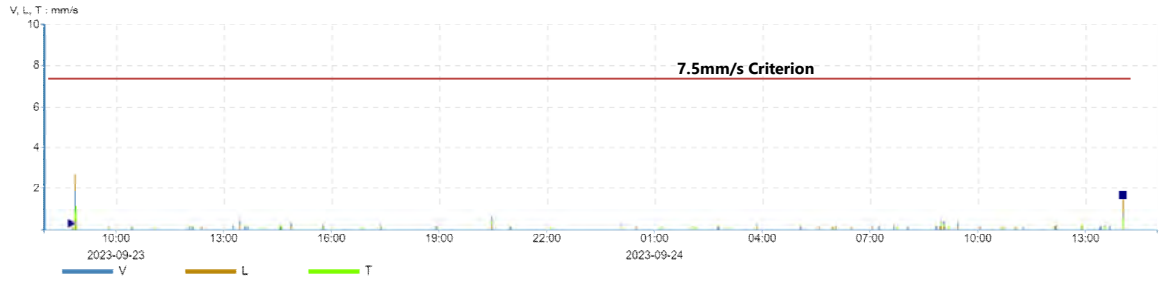
4.1 Dulwich Hill Station vibration monitoring

In accordance with the Noise and Vibration Management Plan[2], the applicable vibration screening criterion for cosmetic damage is as follows:

- Heritage structures (structurally sound): 7.5 mm/s

The results of the unattended vibration measurements for Dulwich Hill Station are presented in Figure 4.1.

Figure 4.1: Unattended vibration monitoring at Dulwich Hill Station (refer to Appendix A.2)



It can be seen in Figure 4.1 that the vibration levels produced from the measured works were below 7.5 mm/s criterion. Therefore, the risk of cosmetic damage is assessed as low.

5 Conclusion

Renzo Tonin and Associates has completed noise and vibration monitoring during the WE13 possession for Sydney Metro Southwest Station Upgrades works.

The results of the noise measurements were below the predicted noise levels presented in the Gatewave model prepared for the works.

The results of the unattended vibration measurement were below the 7.5 mm/s vibration criterion. Therefore, the risk of cosmetic damage from the measured works is assessed as low.

[2] Southwest Metro – Dulwich Hill, Campsie and Punchbowl Station Upgrades Noise and Vibration Management Plan, version Rev06, Review date: 13 May 2022

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
28.09.2023	First issue	0	1	D. Auld	R. Zhafranata	R. Zhafranata

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APPENDIX A Monitoring locations

A.1 Hurlstone Park Station: 105 Duntroon Street, 107 Duntroon Street, 6 Hopetoun Street

A.2 Hurlstone Park Station: 7 Bedford Crescent, 244 Wardell Road, 51 Ewart Lane

APPENDIX 12 – TL927-1-46F01 2023 WE14 NOISE MONITORING REPORT

13 October 2023
TL927-1-46F01 WE14 Noise Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - WE14 Noise Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise monitoring during the WE14 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model (Gatewave scenario ID: 8314) prepared for the works. This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Dulwich Hill Station on 30th September 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model. The measurement locations are listed in Table 2.1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2.1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	244 Wardell Road, Dulwich Hill (Appendix A.1)	30.09.2023 08:04am - 08:19am	Power and non-powered hand tools	Noise	40m	-
M2	7 Bedford Crescent, Dulwich Hill (Appendix A.1)	30.09.2023 08:24am - 08:39am	Power hand tools and excavator with bucket attachment	Noise	60m	-
M3	51 Ewart Lane, Dulwich Hill (Appendix A.1)	30.09.2023 08:51am - 09:06am	Trucks, power hand tools and excavator with bucket attachment	Noise	20-70m	-

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2.2 summarises the details of noise measurement equipment.

Table 2.2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	#A2A-16217-E0	4 August 2023
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	#3009707	17 January 2023

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2.3. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2.3: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	244 Wardell Road, Dulwich Hill	30.09.2023 08:04am - 08:19am	Clear sky; air temperature 23ºC, wind speed < 5m/s; relative humidity 70%
M2	7 Bedford Crescent, Dulwich Hill	30.09.2023 08:24am - 08:39am	Clear sky; air temperature 24ºC, wind speed < 5m/s; relative humidity 70%
M3	51 Ewart Lane, Dulwich Hill	30.09.2023 08:51am - 09:06am	Clear sky; air temperature 25ºC, wind speed < 5m/s; relative humidity 70%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3.1.

Table 3.1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	244 Wardell Road, Dulwich Hill	EWP, lighting tower, hand tools, delivery trucks, excavator w bucket (13t), Hiab, 10T hi-rail hydrema, compactor, concrete cutting saw, jackhammer, generator, truck and dog and telehandler	85[H]	Power and non-powered hand tools	67	88	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 30m. • It was noted that the measured works were intermittent.
M2	7 Bedford Crescent, Dulwich Hill	EWP, lighting tower, hand tools, delivery trucks, excavator w bucket (13t), Hiab, 10T hi-rail hydrema, compactor, concrete cutting saw, jackhammer, generator, truck and dog and telehandler	83[H]	Power hand tools and excavator with bucket attachment	56	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 60m away. In the prediction model, the distance between the closest work area and the most affected facade is 35m.
M3	51 Ewart Lane, Dulwich Hill	EWP, lighting tower, hand tools, delivery trucks, excavator w bucket (13t), Hiab, 10T hi-rail hydrema, compactor, concrete cutting saw, jackhammer, generator, truck and dog and telehandler	83[H]	Trucks, power hand tools and excavator with bucket attachment	67	88	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 20-70m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m.

Notes: H: Predicted $L_{Aeq, 15min}$ for High impact activities.

4 Conclusion

Renzo Tonin and Associates has completed noise monitoring during the WE14 possession for Sydney Metro Southwest Station Upgrade works.

The results of the noise measurements were below the predicted noise levels presented in the Gatewave model prepared for the works.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
13.10.2023	First issue	0	1	D. Auld	R. Zhafranata	R. Zhafranata

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APPENDIX A Monitoring locations

A.1 Dulwich Hill Station: 7 Bedford Crescent, 244 Wardell Road, 51 Ewart Lane

APPENDIX 13 – TL927-1-47F01 2023 WE17 NOISE AND VIBRATION MONITORING REPORT

31 October 2023
TL927-1-47F01 WE17 Noise and Vibration Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - WE17 Noise and Vibration Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise monitoring during the WE17 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model (Gatewave scenario ID: 8473) prepared for the works. The vibration monitoring was undertaken to monitor potentially affected structures. This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Dulwich Hill and Hurlstone Park on 21st October 2023. Unattended vibration monitoring was undertaken at Dulwich Hill Station between 21st October 2023 and 22nd October 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave models or at the closest representative noise impacted receiver. The measurement locations are listed in Table 2.1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2.1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	5 Bedford Crescent, Dulwich Hill (Appendix A.1)	21.10.2023 01:48pm - 02:03pm	Hi-rail excavator and power/non-power handtools	Noise	30m	-
M2	57A Ewart Street, Dulwich Hill (Appendix A.1)	21.10.2023 02:10pm - 02:25pm	Light vehicle, power/non-power handtools and hi-rail excavator	Noise	40m	-
M3	244 Wardell Road, Dulwich Hill (Appendix A.1)	21.10.2023 02:29pm - 02:44pm	Power/non-power handtools	Noise	30m	-
M4	105 Duntroon Street, Hurlstone Park (Appendix A.2)	21.10.2023 02:57pm - 03:12pm	Mobile crane and power/non-power handtools	Noise	15m	-
M5	107 Duntroon Street, Hurlstone Park (Appendix A.2)	21.10.2023 03:15pm - 03:30pm	Mobile crane and power/non-power handtools	Noise	30m	-
M6	3A Commons Street, Hurlstone Park (Appendix A.2)	21.10.2023 03:40pm - 03:55pm	Power/non-power handtools	Noise	70m	-
M7	Dulwich Hill Station concourse	21.10.2023 – 22.10.2023 01:30pm – 01:00pm	Power hand tools	Vibration	1-5m	N/A

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2.2 summarises the details of noise measurement equipment.

Table 2.2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	#A2A-20898-E0	25 July 2022
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	#2677710	17 July 2023

The instrumentation used for the vibration measurement are summarised in Table 2.3. The transducers used in the measurements have current calibration certificates. For monitoring on hard surfaces (e.g.

asphalt), in accordance with AS 2775-2004[1], the surface was brushed to displace any dirt and the transducers were attached to the surface using double sided adhesive tape.

Table 2.3: Summary of vibration instrumentation

Type	Make / Model
Triaxial Transducers	Sigicom C22 (SN: 102478)

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2.4. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2.4: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	5 Bedford Crescent, Dulwich Hill	21.10.2023 01:48pm - 02:03pm	Clear sky; air temperature 25ºC, wind speed < 5m/s; relative humidity 55%
M2	57A Ewart Street, Dulwich Hill	21.10.2023 02:10pm - 02:25pm	Cloudy sky; air temperature 25ºC, wind speed < 5m/s; relative humidity 56%
M3	244 Wardell Road, Dulwich Hill	21.10.2023 02:29pm - 02:44pm	Cloudy sky; air temperature 26ºC, wind speed < 5m/s; relative humidity 57%
M4	105 Duntroon Street, Hurlstone Park	21.10.2023 02:57pm - 03:12pm	Clear sky; air temperature 24ºC, wind speed < 5m/s; relative humidity 58%
M5	107 Duntroon Street, Hurlstone Park	21.10.2023 03:15pm - 03:30pm	Cloudy sky; air temperature 23ºC, wind speed < 5m/s; relative humidity 59%
M6	3A Commons Street, Hurlstone Park	21.10.2023 03:40pm - 03:55pm	Cloudy sky; air temperature 23ºC, wind speed < 5m/s; relative humidity 60%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3.1.

[1] Australia Standard 2775-2004 Mechanical vibration and shock – Mechanical mounting of accelerometers

Table 3.1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq(15min)}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq(15min)}$	L_{Amax}		
M1	5 Bedford Crescent, Dulwich Hill	Excavator w bucket (13t), jackhammer, concrete cutting saw, telehandler / franna crane, hand tools, lighting tower, generator, 10T hi-rail hydrema, delivery truck, EWP and hiab	76[H]	Hi-rail excavator and power/non-power handtools	55	74	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M2	57A Ewart Street, Dulwich Hill	Excavator w bucket (13t), jackhammer, concrete cutting saw, telehandler / franna crane, hand tools, lighting tower, generator, 10T hi-rail hydrema, delivery truck, EWP and hiab	74[H]	Light vehicle, power/non-power handtools and hi-rail excavator	58	80	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 40m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured works were intermittent.
M3	244 Wardell Road, Dulwich Hill	Excavator w bucket (13t), jackhammer, concrete cutting saw, telehandler / franna crane, hand tools, lighting tower, generator, 10T hi-rail hydrema, delivery truck, EWP and hiab	73[H]	Power/non-power handtools	66	82	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 25m. • It was noted that the measured works were intermittent.
M4	105 Duntroon Street, Hurlstone Park	Hi-rail multicrane and hand tools	81[T]	Mobile crane and power/non-power handtools	59	80	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 1m. • The measured crane works were at a lower ground level than the monitoring location. As a result, the works were shielded. • It was noted that the measured works were intermittent.
M5	107 Duntroon Street, Hurlstone Park	Hi-rail multicrane and hand tools	76[T]	Mobile crane and power/non-power handtools	52	69	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The measured works were approximately 30m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • The measured crane works were at a lower ground level than the monitoring location. As a result, the works were shielded. • It was noted that the measured works were intermittent.
M6	3A Commons Street, Hurlstone Park	Hi-rail multicrane and hand tools	79[T]	Power/non-power handtools	50	73	No ($L_{Aeq, 15min}$)	The measured $L_{Aeq, 15min}$ is below the predicted noise level. This can be attributed to: • The measured works were approximately 70m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • The measured crane works were at a lower ground level than the monitoring location. As a result, the works were shielded. • It was noted that the measured works were intermittent.

Notes: H: Predicted $L_{Aeq, 15min}$ for High impact activities.
T: Predicted $L_{Aeq, 15min}$ for Typical impact activities.

4 Vibration Monitoring results

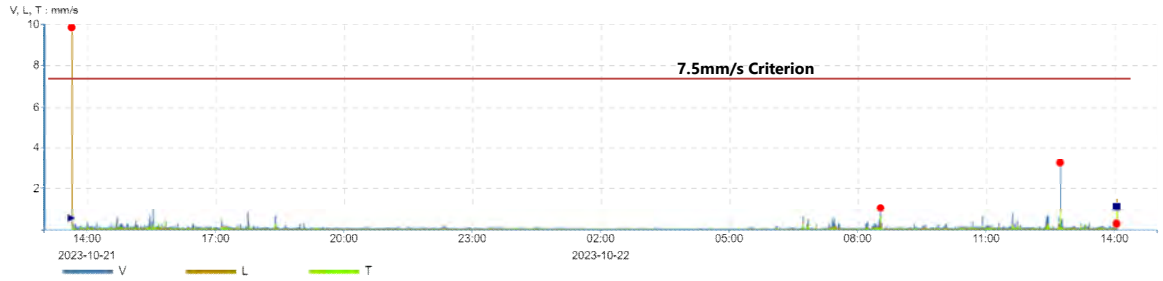
4.1 Dulwich Hill Station vibration monitoring

In accordance with the Noise and Vibration Management Plan[2], the applicable vibration screening criterion for cosmetic damage is as follows:

- Heritage structures (structurally sound): 7.5 mm/s

The results of the unattended vibration measurements for Dulwich Hill Station are presented in Figure 4.1.

Figure 4.1: Unattended vibration monitoring at Dulwich Hill Station (refer to Appendix A.1)



It can be seen in Figure 4.1 that the vibration levels produced from the measured works were below 7.5 mm/s criterion except for one instance which was due to the installation of the monitor. Therefore, the risk of cosmetic damage is assessed as low.

5 Conclusion

Renzo Tonin and Associates has completed noise and vibration monitoring during the WE17 possession for Sydney Metro Southwest Station Upgrade works.

The results of the noise measurements were below the predicted noise levels presented in the Gatewave model prepared for the works.

The results of the unattended vibration measurement were below the 7.5 mm/s vibration criterion. Therefore, the risk of cosmetic damage from the measured works is assessed as low.

[2] Southwest Metro – Dulwich Hill, Campsie and Punchbowl Station Upgrades Noise and Vibration Management Plan, version Rev06, Review date: 13 May 2022

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
31.10.2023	First issue	0	1	D. Auld	R. Zhafranata	R. Zhafranata

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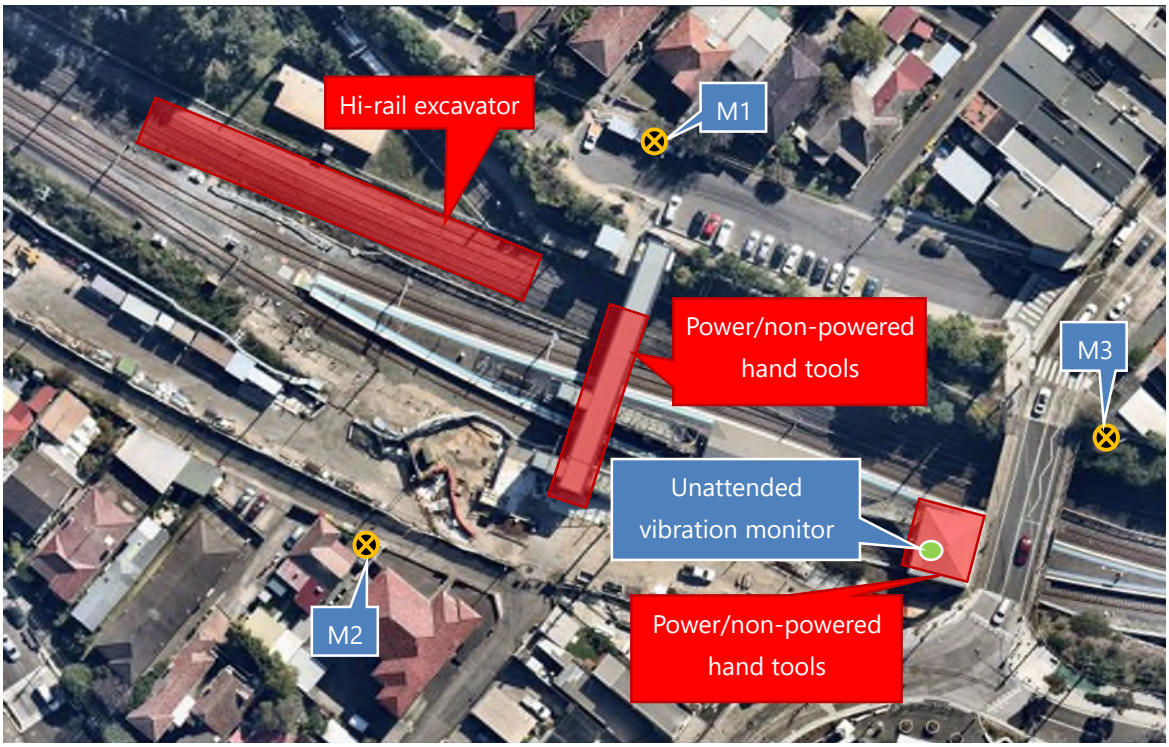
APPENDIX A Monitoring locations

A.1 Dulwich Hill Station: 5 Bedford Crescent, 242 Wardell Road, 57A Ewart Street



A.2 Hurlstone Park Station: 105 Duntroon Street, 107 Duntroon Street, 3A Commons Street

APPENDIX 14 – TL927-1-48F01 2023 WE20 NOISE MONITORING REPORT

20 November 2023
TL927-1-48F01 WE20 Noise Monitoring Report (r1)

Downer EDI Works Pty Ltd
Gate 99, Bridge Road
Belmore New South Wales 2192

Sydney Metro Southwest - Stations Upgrades - WE20 Noise Monitoring Report

1 Introduction

Renzo Tonin and Associates was engaged by Downer EDI Works to conduct noise monitoring during the WE20 possession for Sydney Metro Southwest Station Upgrades works. The noise monitoring was undertaken to verify predicted noise levels in the Gatewave model (Gatewave scenario ID: 8520) prepared for the works. This report provides a summary of the monitoring results.

2 Details of monitoring

Noise monitoring was undertaken at Dulwich Hill and Punchbowl Station on 11th November 2023.

2.1 Measurement location

The noise measurements were conducted at the nominated monitoring locations from the Gatewave model or at the closest representative noise impacted receiver. The measurement locations are listed in Table 2.1. Figures depicting the monitoring locations are included in APPENDIX A.

Table 2.1: Measurement locations

Measurement ID	Assessment Point	Date and time	Measured plant	Monitoring type	Approx. distance to measured plant	Temporary noise barrier between measured plant/receiver
M1	41 Urunga Parade, Punchbowl (Appendix A.1)	11.11.2023 09:48am - 10:03am	Generator	Noise	30m	-
M2	5 Bedford Crescent, Dulwich Hill (Appendix A.2)	11.11.2023 10:37am - 10:52am	Light vehicle and EWP	Noise	3-55m	-
M3	7 Bedford Crescent, Dulwich Hill (Appendix A.2)	11.11.2023 10:53am - 11:08am	Power/non-power handtools and EWP	Noise	15-50m	-
M4	57A Ewart Street, Dulwich Hill (Appendix A.2)	11.11.2023 11:17am - 11:32am	Generator	Noise	15m	Noise blankets were installed around the generator

2.2 Measurement equipment

Noise measurement equipment consisted of one NTi Audio XL2 Type 1 sound level meter and microphone calibrator. The microphone was checked prior and after measurements using a Bruel and Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with AS IEC 61672.1 2004 '*Electroacoustics – Sound Level Meters*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

Table 2.2 summarises the details of noise measurement equipment.

Table 2.2: Summary of noise measurement equipment

Instrument	Make	Model	Serial Number	Last Calibrated
Type 1 Sound Level Meter	NTi	XL2	#A2A-17457-E0	17 July 2023
Type 1 Sound Level Meter Calibrator	Bruel and Kjaer	Type 4231	#3006707	17 January 2023

2.3 Environmental conditions

Environmental conditions recorded during the measurements are provided in Table 2.3. Environmental conditions did not have an adverse effect on the measured noise levels.

Table 2.3: Environmental conditions

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M1	41 Urunga Parade, Punchbowl	11.11.2023 09:48am - 10:03am	Clear sky; air temperature 23ºC, wind speed < 5m/s; relative humidity 64%

Measurement ID	Assessment Point	Date and Time	Environmental Conditions
M2	5 Bedford Crescent, Dulwich Hill	11.11.2023 10:37am - 10:52am	Clear sky; air temperature 27ºC, wind speed < 5m/s; relative humidity 70%
M3	7 Bedford Crescent, Dulwich Hill	11.11.2023 10:53am - 11:08am	Clear sky; air temperature 27ºC, wind speed < 5m/s; relative humidity 70%
M4	57A Ewart Street, Dulwich Hill	11.11.2023 11:17am - 11:32am	Clear sky; air temperature 28ºC, wind speed < 5m/s; relative humidity 71%

3 Noise Monitoring results

The results of the noise monitoring are presented in Table 3.1.

Table 3.1: Noise monitoring results

Measurement ID	Assessment Point	Prediction assumption (plant and equipment)	Predicted noise level $L_{Aeq,15min}$, dB(A)	Measured plant	Measured noise level dB(A)		Above predicted noise level?	Comments
					$L_{Aeq,15min}$	L_{Amax}		
M1	41 Urunga Parade, Punchbowl	Hand tools and EWP	52[T]	Generator	54 (44[1])	77	No ($L_{Aeq,\ 15min}$)	The Downer construction contribution $L_{Aeq,15min}$ is below the predicted noise level. The following observations were made on site: • Downer platform works (hand tools and EWPs) approximately 170m away were inaudible at the monitoring location. • Given the construction noise (Downer works) was not audible at this monitoring location, the contribution from the construction works can be assumed to be 10dB below the measured $L_{Aeq,15min}$. As a result, the contribution from the Downer works can be calculated to be 44 dB(A), which is below the predicted noise level of 52 dB(A). • There was a site office generator from John Holland site producing a constant noise source of L_{AF} 48-49 dB(A).
M2	5 Bedford Crescent, Dulwich Hill	EWP, lighting tower, hand tools, generator, 13t excavator with bucket attachment, jackhammer, concrete saw, 20t Franna crane, 10t hi-rail hydrema, hiab and delivery truck	76[H]	Light vehicle and EWP	60	73	No ($L_{Aeq,\ 15min}$)	The measured $L_{Aeq,15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 3-55m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that the measured EWP works were intermittent.
M3	7 Bedford Crescent, Dulwich Hill	EWP, lighting tower, hand tools, generator, 13t excavator with bucket attachment, jackhammer, concrete saw, 20t Franna crane, 10t hi-rail hydrema, hiab and delivery truck	75[H]	Power/non-power handtools and EWP	55	77	No ($L_{Aeq,\ 15min}$)	The measured $L_{Aeq,15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 15-50m away. In the prediction model, the distance between the closest work area and the most affected facade is 7m. • It was noted that the measured EWP works were intermittent.
M4	57A Ewart Street, Dulwich Hill	EWP, lighting tower, hand tools, generator, 13t excavator with bucket attachment, jackhammer, concrete saw, 20t Franna crane, 10t hi-rail hydrema, hiab and delivery truck	74[H]	Generator	62	77	No ($L_{Aeq,\ 15min}$)	The measured $L_{Aeq,15min}$ is below the predicted noise level. This can be attributed to: • Less plant and equipment operating during the measurement compared to the modelled prediction. • No high noise impact equipment was used during the monitoring period. • The measured works were approximately 15m away. In the prediction model, the distance between the closest work area and the most affected facade is 5m. • It was noted that there were noise blankets installed around the generator.

Notes:
H: Predicted $L_{Aeq,15min}$ for High impact activities.
T: Predicted $L_{Aeq,15min}$ for Typical impact activities.
1: Calculated $L_{Aeq,15min}$ contribution from Downer works, given that the construction noise was not audible or barely audible at the monitoring location.

4 Conclusion

Renzo Tonin and Associates has completed noise monitoring during the WE20 possession for Sydney Metro Southwest Station Upgrade works.

The results of the noise measurements were below the predicted noise levels presented in the Gatewave model prepared for the works.

Document control

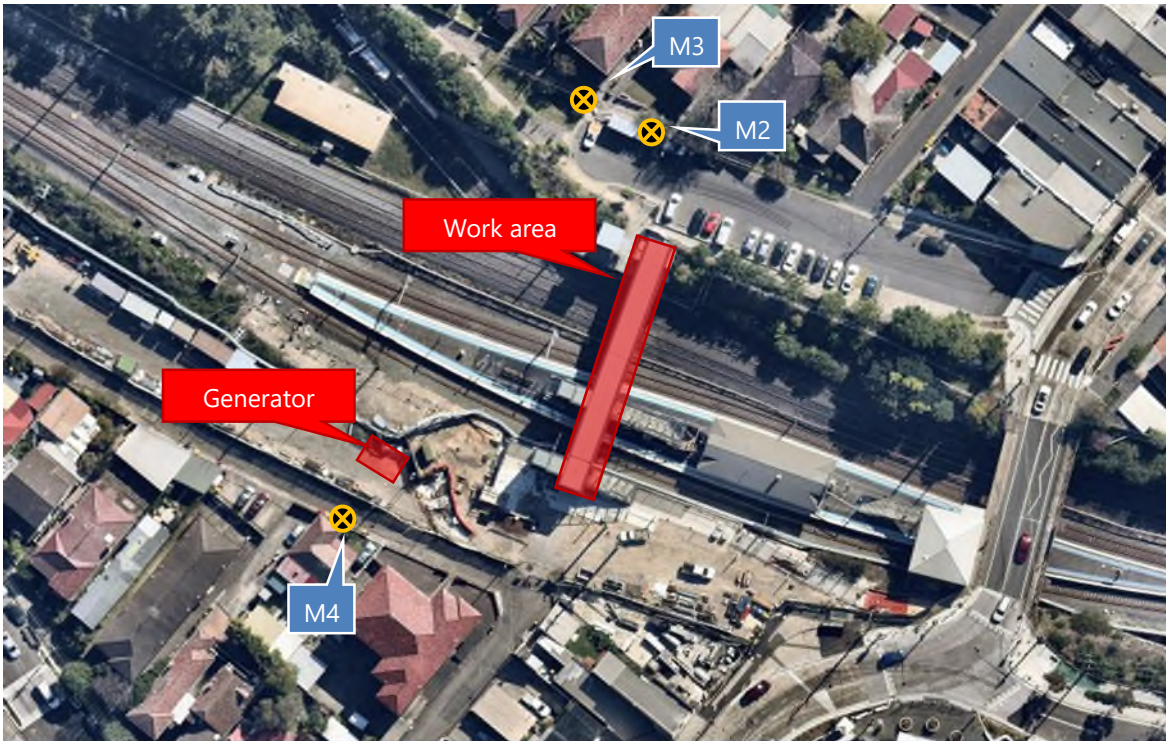
Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
20.11.2023	First issue	0	1	A. Hannelly	R. Zhafranata	R. Zhafranata

File Path: R:\AssocSydProjects\TL901-TL950\TL927 Southwest Metro - Stations Upgrades\1 Docs\48 WE20 2023 Noise Monitoring\TL927-1-48F01 WE20 Noise Monitoring Report (r1).docx

APPENDIX A Monitoring locations

A.1 Punchbowl Station: 41 Urunga Parade, Punchbowl

A.2 Dulwich Hill Station: 5 Bedford Crescent, 7 Bedford Crescent and 57A Ewart Street, Dulwich Hill



APPENDIX 15 – PH INCIDENT REPORT (WILEY PARK)

Environmental Incident and Non-compliance Notification Report

Record only factual information that you know to be correct. Do not make assumptions, be succinct and avoid speculation.

Section 1: General Details			
Contractor:	DT Infrastructure (DTI)		
Site:	Wiley Park		
Sydney Metro ID Code: (If known)	TBC	**Contractor Reference ID:** (If known)	P6WP
Date of Incident or Non-compliance:	26 August 2024	**Time of Incident or Non-compliance:**	-
Date of notification:	26 August 2024	**Time of notification:**	16h00
Method of notification:	The incident was raised by the project's ER. Metro SW was notified via email.		
Notification received by: (Name)	Geraldine Figueira – Environment, Sustainability & Heritage Advisor (DTI) Brett McLennan – Environment Representative (Healthy Buildings International Pty Ltd) Emmanuel Smith – Environmental Project Manager (Sydney Metro)		
Notification received by: (Position)	As above.		

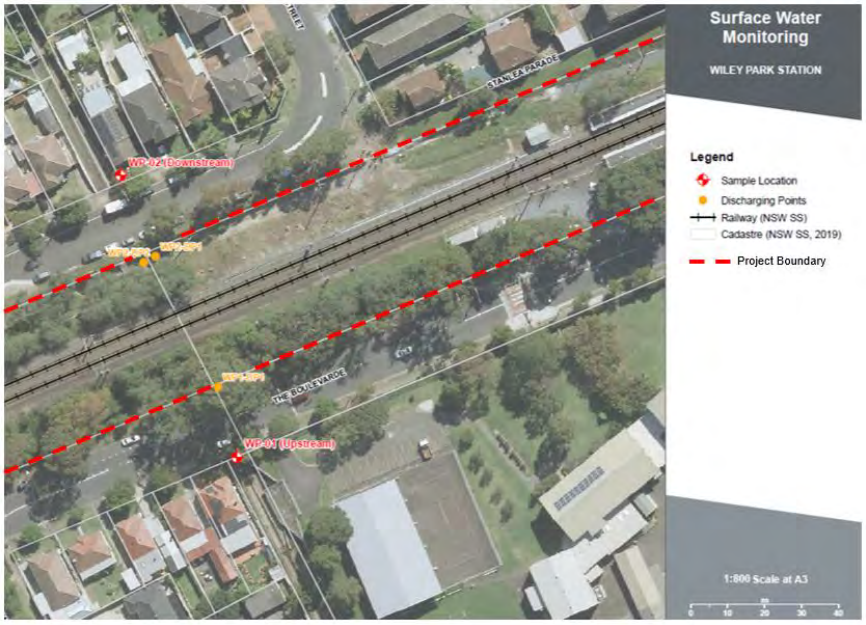
Event Classification:	☐ Non-compliance **(complete Sections 6 & 7 only)**	☒ Class 3	☐ Class 2	☐ Class 1
Probable Impact Duration	☐ Short term (less than 1 week)	☐ Medium term (less than 3 months)	☒ Long term (greater than 3 months)	☐ Permanent

Incident Properties: (Tick as many as appropriate, where significant off-site impacts on people or the biophysical environment occurs this incident is also notifiable to DPIE)	☐ **Notifiable event** (also complete Section 4)
	☐ **Environmental Requirements Breached** (also complete Section 6)

Incident type (choose one):

☐ **Air Quality** (e.g. dust or odour emission, excessive exhaust from plant or equipment)	☐ **Heritage** (e.g. damage/disturbance to heritage item/object/place)	☐ **Noise & Vibration** (e.g. exceedances of noise and vibration limits)
☐ **Flora and Fauna** (damage/harm to species /habitat/ecological community)	☐ **Spills and Leaks** (e.g. escape of fluids from containers)	☐ **Traffic, Transport & Access** (e.g. Issues regarding the management of traffic flow)
☒ **Soil and Water** (events where harmful materials escape into soil or discharge to any onsite or offsite waterway)	☐ **Community, Stakeholder and Business** (e.g. events causing impacts on community amenity/property)	☐ **Waste & Spoil** (e.g. disposal causing environmental harm or improper stockpile management)
☐ **Management Systems** (e.g. Non-Compliance with project approval, or a CEMP requirement)		

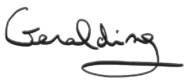
Section 2: Circumstances and Corrective Actions

Exact location: (address, chainage, nearest cross street, landmarks etc., attach sketch if appropriate.)	Wiley Park Station – Water monitoring locations  *Figure 1. Water monitoring locations*
Circumstances: (Outline the circumstances of the Incident leading up to the event and detail the activity being conducted)	- In accordance with the project requirements, DTI has been undertaking water monitoring (through a consultant – Stantec) to monitor established discharge points at Wiley Park Station. - One background measurement was undertaken prior to works starting. This measurement, although it provides some general information of the water quality of the stream that traverses this area, doesn't provide enough information to understand the behaviour of this stream regarding the different measurable parameters. <u>pH levels</u> - During the background level measurement, pH levels were outside the ideal range criteria established for the lowland rivers. - Wiley Park construction works included introducing a large amount of concrete in the area, as well as landscaping and fertiliser in the vicinity of the stream. pH levels have consistently been out of the ideal range. <u>Nutrient levels</u> - During the background level measurement, nutrient levels were outside the ideal range criteria established for the lowland rivers for phosphorus and nitrogen. - These levels continued off-balance throughout the several water monitoring events. - It was noted that during the project, high levels of algal growth occurred at the open stormwater v drain that captures water from the NE side of the station (near Shadforth Street). This drain is fed by three subsurface stormwater pipes that discharge at the headwall west of Shadforth Street.
Corrective Actions: (Actions taken immediately to address the cause of environmental harm)	DTI is to continue measuring pH levels as per the approved water monitoring program.

~~Section 3: Other Relevant Information (pollution events only)~~			
~~Pollutant:~~			
~~Quantity or volume:~~		~~Concentration:~~	
~~Location of Pollution:~~ ~~(If different from the exact location of the event, also describing the extent of the pollution)~~			
Section 4: Notification to Relevant Authorities (notifiable events only)			
~~Relevant Authorities to be notified:~~ ~~(relevant information to be given in this notification is contained within this form)~~	~~Incident Observer immediate verbal notification made to:~~ ☐ ~~Sydney Metro Nominated Environmental Representative~~ ☐ ~~Principal Contractor's Environment Manager~~ ~~Sydney Metro Nominated Environmental Representative immediately notified:~~ ☐ ~~Local Authority (Council)~~ ☐ ~~EPA (through the Pollution Hotline on 131 555)~~ ☐ ~~Ministry of Health~~ ☐ ~~WorkCover Authority~~ ~~As soon as possible following immediate notification requirements:~~ ☐ ~~Department of Planning, Industry and Environment~~ ☐ ~~Independent Environmental Representative~~		
~~Relevant Authority Notification made by: (Name)~~	~~N/A~~		
~~Relevant Authority Notification made by: (Position)~~	~~N/A~~		
~~Date of notification:~~	~~N/A~~	~~Time of notification:~~	~~N/A~~

Section 5: Incident Investigation Details			
Investigation Details: (Actions taken immediately to prevent or minimise environmental harm)	Nutrient levels - Investigations were conducted during 2022 to try and identify the nutrient source promoting the algae growth. Algal growth was observed where the two northern subsurface stormwater pipes ended at the headwall, suggesting that water entering the v-drain from the subsurface stormwater pipes had nutrient concentrations and conditions supportive of algal growth. It was concluded that the source of the nutrients supportive of algal growth within the v-drain was considered to be off-site, coming from the off-site urban stormwater drainage system that collects surface runoff at Shadforth Street and the unnamed lane located east of Stanley Parade, which has been identified to contain elevated nutrient levels. It is worth noting that the algae growth is a pre-existing problem, as the DTI PM for the station informed that there was algae in the drain prior to DTI (then Downer) starting works at the station. - Dispersion of rock by DTI on the v-drain seems to have diminished the algae growth. pH levels - Water monitoring has been regularly undertaken by DTI (through Stantec) in accordance with the approved Soil and Water Management Plan. More detailed investigations have been undertaken during the project to understand potential causes for the elevated pH levels. pH was measured using samples of soil paste collected from areas potentially forming the catchment area to the platform drainage (including the batter on the northern face of the Platform 1) using an on-site soil pH testing kit (Manutec) as well as laboratory analysis. All accessible platform buildings were investigated for potential sources (e.g., storage for cleaning products, etc.) that could elevate the pH levels. All the DTI (then Downer) storage within the potential catchment area to the platform drainage was also inspected for any potential pH-elevating sources. Platform 1 ACO drain was inspected, and water was collected from the drain for sampling. - The assessed soil materials were alkaline with pH that ranged from 8.5 to 9.6. The water used for the testing had a significant pH increase after entering the ACO drain, which indicated the presence of potential source(s) that contributed to the pH increase within the drain. The pH measurements of the soil/ sediment materials sampled from the ACO drain were all alkaline, which was consistent with the soil pH measured from the surrounding soils within the areas that were considered to fall within the catchment area of the Platform 1 drainage system. The pH value measured at the downstream discharge point (i.e., Head Wall 1) was 9.78 which was the highest pH value measured from all the water pH monitoring points associated with this ACO drain tap water check during the investigation. This result also indicated the likelihood of the presence of alkaline materials (e.g., alkaline soil, alkaline sediment, etc.) within the underground drainage. - As per the recommendations in Stantec's report, the drainage system was cleaned of debris/ sediment. Validation testing was undertaken and levels ranged between 7.12 and 7.44, which is within the applicable assessment criteria range. pH measured at the discharge point of Platform 1 drainage system was within the applicable assessment criteria range. To note that the downstream pH levels were still higher than the upstream. Nevertheless, pH levels showed to be decreasing since completion of the earthworks and landscaping and it was anticipated the downstream pH would become similar to upstream pH levels. - A trend assessment was undertaken by Stantec mid-2024 and the pH levels seem to have started to stabilise. It is theorised that this will take some time to occur due to the elevated amount of concrete introduced at the station for the SW Metro works, in accordance with the SMW design. pH monitoring will continue as per the Water Monitoring program to document these levels. - It is worth it to note that water monitoring at the downstream monitoring location data didn't indicate that environmental harm occurred.		

Report Due Date	**Allocated to**	**Comments**	
	Geraldine Figueira		
Relevant approval(s):	CSSI 8256	**Relevant condition(s):**	-

Action(s) required for closure: (Where an individual is assigned an action to close a Non-compliance they must notify the Nominated Environmental Representative once this is achieved)	DTI is to continue measuring pH levels as per the approved water monitoring program. The ER has requested the incident remains open pending results from ongoing monitoring and agreement with SM and the ER on cessation of monitoring. It is likely that water monitoring will be continued by the follow-up contractor once DTI is relinquished from being PC of the station.		
Assigned to:	**Geraldine Figueira (Environmental Advisor – Downer EDI)**	**Status:**	☒ Open ☐ Close immediately
~~**Section 6: Non-Compliance (leave blank if unsure)**~~			
~~**Description of non-compliance:**~~			
~~**Relevant approval(s):**~~		~~**Relevant condition(s):**~~	
~~**Action(s) required for closure:**~~ ~~(Where an individual is assigned an action to close a Non-compliance they must notify the Nominated Environmental Representative once this is achieved)~~			
~~**Assigned to:**~~		~~**Status:**~~	~~☐ Open~~ ~~☐ Close immediately~~
Section 7: Signoff			
Signature:			
Name:	Geraldine Figueira		
Position:	Environment, Sustainability Advisor and Heritage Advisor (Downer EDI)		