



ENVIRONMENTAL MONITORING REPORT, DECEMBER 2021

PARRAMATTA LIGHT RAIL INFRASTRUCTURE WORKS

10 January 2022

Parramatta
Connect

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1. Introduction

1.1. Background

Parramatta Light Rail Stage 1 ('Stage 1') will connect Westmead to Carlingford via Parramatta Central Business District (CBD) and Camellia. Stage 1 is expected to be operational in 2023.

Stage 1 will create new communities, connect great places and help both local residents and visitors move around and explore what the region has to offer. The route will link Parramatta's CBD and train station to a number of key locations, including the Westmead Precinct, the Parramatta North Growth Centre, the new Western Sydney Stadium, the Camellia Town Centre, the new Powerhouse Museum and Riverside Theatre arts and cultural precinct, the private and social housing redevelopment at Telopea, the Rosehill Gardens Racecourse and the three Western Sydney University campuses.

Key features of Stage 1 include:

- A new dual track light rail network of approximately twelve (12) kilometres in length, including approximately seven (7) kilometres within the existing road corridor and approximately five (5) kilometres within the existing Carlingford Line and Sandown Line, replacing current heavy rail services
- Sixteen (16) stops that are fully accessible and integrated into the urban environment including a terminus stop at each end of Westmead and Carlingford
- High frequency 'turn-up-and-go' services operating seven days a week from 5am to 1am. Weekday services will operate approximately every 7.5 minutes in the peak period between 7am and 7pm
- Modern and comfortable air-conditioned light rail vehicles, nominally 45 metres long and driver-operated, each carrying up to 300 passengers.
- Intermodal interchanges with existing public transport services at Westmead terminus, Parramatta CBD and the Carlingford terminus
- Creation of two light rail and pedestrian zones (no general vehicle access) within the Parramatta CBD along Church Street (generally between Market Street and Macquarie Street) and along Macquarie Street (generally between Horwood Place and Smith Street)
- A Stabling and Maintenance (SaM) Facility located in Camellia for light rail vehicles to be stabled, cleaned and maintained
- New bridge structures along the alignment including over James Ruse Drive and Clay Cliff Creek, Parramatta River (near the Cumberland Hospital), Kissing Point Road and Vineyard Creek, Rydalmere
- Alterations to the existing road network including line marking, additional traffic lanes and turning lanes, new traffic signals, and changes to traffic flows
- Relocation and protection of existing utilities
- Public domain and urban design works along the corridor and at Stop precincts
- Closure of the heavy rail line between Carlingford and Clyde
- Active transport corridors and additional urban design features along sections of the alignment and within Stop precincts
- Integration with the Opal Electronic Ticketing System (ETS)
- Real time information in light rail vehicles and at Stops via visual displays and audio.



1.1.1. Statutory Context

The Parramatta Light Rail is classified as Critical State Significant Infrastructure (CSSI) and was subject to environmental impact assessment under the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EIS assessed impacts for Parramatta Light Rail Stage 1 (Westmead to Carlingford) including the light rail and associated road enabling works.

Stage 1 received Infrastructure Approval from the Minister for Planning under Section 5.19 of the EP&A Act on 29 May 2018 (Critical State Significant Infrastructure Application SSI-8285), subject to the conditions provided in the Instrument of Approval, specifically Schedule B – Ministerial Conditions of Approval.

The Infrastructure Approval was subsequently modified under Section 5.25 of the EP&A Act on 21 December 2018 and 25 January 2019.

The planning approval, modifications and related environmental assessment documents are located at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8285.

A Construction Environmental Management Plan (CEMP) has been prepared for the Parramatta Light Rail Package 4 – Infrastructure Works (Infrastructure Works). The purpose of the CEMP and associated Sub-plans is to address the requirements of the:

- Minister’s Conditions of Approval (CoA) SSI-8285
- Revised Environmental Mitigation and Management Measures (REMMMs)
- Environmental Performance Outcomes (EPOs)
- Applicable legislation and contractual requirements, including the PLR Stage 1 Infrastructure Contract Project Deed (ISD-17-6721).

The REMMMs and EPOs are listed in Parramatta Light Rail Stage 1 Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement (the EIS), as amended by the Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Submissions Report (incorporating Preferred Infrastructure Report) (March 2018) (the SPIR). The CEMP and associated Sub-plans were approved the Secretary on the 21 November 2019.

1.2. Scope

The scope of this report is to present monthly results of the inspection and monitoring programs outlined in the Infrastructure Works CEMP and associated Sub-plans, including the results of the construction monitoring programs referred to in Condition C9 of the Planning Infrastructure Approval.

Environmental inspections and monitoring are undertaken to:

- Validate the predicted impacts of the Infrastructure Works
- Measure the effectiveness of environmental controls
- Track progress against targets and objectives of the CEMP.

The monitoring requirements for nominated aspects are included in the relevant Sub-plans and summarised in **Table 1-1**.

Where relevant, data will be presented on a progressive basis (i.e. monthly summary) to identify trends.

The data of the monitoring programs will also be reviewed annually in the Annual Environment Report.



Table 1-1 Monthly Environmental Monitoring Reporting Requirements

CEMP or Sub-plan	Monitoring program	Distribution
Noise and Vibration Management Sub-plan	<ul style="list-style-type: none"> - Locations and descriptions of monitoring undertaken - Noise monitoring results - Summary of any exceedance of the nominated criteria - Corrective actions 	<ul style="list-style-type: none"> - City of Paramatta Council - Cumberland Council - EPA - NSW Health - TfNSW - IC - ER - AA - Made publicly available
Soil and Water Management Sub-plan	<ul style="list-style-type: none"> - Weather forecasts and observations - Water Quality (Turbidity) monitoring - Discharge and dewatering monitoring 	<ul style="list-style-type: none"> - City of Paramatta Council - Cumberland Council - EPA - DOI Water - TfNSW - IC - Made publicly available
Air Quality and Dust Management Sub-plan	<ul style="list-style-type: none"> - Weather observations - Dust deposition monitoring - Real time aerosol dust monitors - Asbestos fibre air monitoring 	<ul style="list-style-type: none"> - EPA - TfNSW - IC - Made publicly available
Grey-headed Flying-fox (GHFF) Construction Monitoring Program	<ul style="list-style-type: none"> - Weekly visual checks of GHFF camp during high risk periods (1 September to 31 January) 	<ul style="list-style-type: none"> - TfNSW



2. Site Activities

Table 2-1 provides a summary of the site activities for this reporting period (26 November 2021 to 25 December 2021).

Table 2-1 Site Activities During Reporting Period

Precinct	Site Activities
Westmead and North Parramatta	Westmead <ul style="list-style-type: none"> Ongoing utility, overhead wiring, lighting, traffic signal, property adjustment, drainage, Combined Service Route (CSR), track works, road works (including kerb and gutter) and landscaping
	Cumberland <ul style="list-style-type: none"> Ongoing utility, overhead wiring, lighting, drainage, CSR, track works, road works (including kerb and gutter)
	North Parramatta <ul style="list-style-type: none"> Ongoing utility, overhead wiring, lighting, traffic signal, property adjustment, drainage, CSR, track works, road works (including kerb and gutter) and landscaping
Parramatta CBD	Area 2 West (CBD) <ul style="list-style-type: none"> Ongoing utility / services works including Multi-Function Poles (MFPs), Low Voltage (LV) and property connections Civil Works (CSR, pavement adjustments): Macquarie Street; North Lennox Bridge Drainage: North Lennox Bridge; Macquarie Street, Smith Street Intersection Track works: Church Street (North Lennox), Macquarie Street Paving (track and footpaths): Church Street, Macquarie Street Rail grinding Finishing works (George Street to Horwood Place) Road resurfacing and permanent traffic switch of Macquarie Street (O'Connell Street to Horwood Place) Intersection works: Macquarie Street / Smith Street
	Area 2 East (Smith Street to Arthur Street) <ul style="list-style-type: none"> Ongoing general utility works (inc. MFPs, LV and lighting) Property Adjustment: George Street, Greek Church Heritage investigations: Greek Church, 153/155 George Street Civil Works (CSR): Macquarie Street; Robin Thomas Reserve; George Street; Tramway Avenue Drainage Works: Macquarie Street; Harris Street; George Street; Road construction: Macquarie Street, George Street, Tramway Avenue Track work: Macquarie Street, George Street, Tramway Paving work: Macquarie Street, Tramway Avenue Landscaping: Tramway Avenue, Robin Thomas Reserve, Macquarie Street Tree Removal Intersection works: Macquarie Street/Smith Street, and Macquarie Street/Harris Street



Precinct	Site Activities
Camellia and Carlingford line	<p data-bbox="470 291 582 324">Camellia</p> <ul data-bbox="486 336 1364 459" style="list-style-type: none"><li data-bbox="486 336 1364 369">– James Ruse Drive Bridge Active Transport Link (ATL) and track works<li data-bbox="486 380 885 414">– Traffic signal and defect works<li data-bbox="486 425 678 459">– Landscaping <p data-bbox="470 470 678 504">Carlingford Line</p> <ul data-bbox="486 515 1348 705" style="list-style-type: none"><li data-bbox="486 515 1348 582">– CSR, drainage, platforms, track and lighting works at Rydalmere and Dundas stops<li data-bbox="486 593 1069 627">– Rail grinding at Rydalmere and Dundas stops<li data-bbox="486 638 1141 672">– Soft landscaping works from Camellia to Carlingford<li data-bbox="486 683 1165 705">– Defect rectification works from Camellia to Carlingford



3. Monitoring Results

Section 3 presents a summary of the environmental inspection and monitoring programs completed during the reporting period (26 November 2021 to 25 December 2021). Detailed monitoring results for each activity are presented in the appendices to this report.

3.1. Inspections

A total of four ER inspections and two AA inspections were completed during the reporting period in addition to 16 internal inspections. It is also noted that TfNSW attend all ER inspections.

Table 3-1 provides a summary of the number of actions raised and closed within the agreed timeframe.

Table 3-1 Inspections for reporting period

Date	Number of Inspections	Type	Actions	Closed in Time
29/11/21	1	AA Inspection	0	N/A
30/11/21	1	Internal Inspection	2	Yes
30/11/21	1	ER Inspection	11	Yes
02/12/21	1	Internal Inspection	3	Yes
06/12/21	1	Internal Inspection	1	Yes
07/12/21	1	Internal Inspection	0	N/A
07/12/21	1	ER Inspection	7	Yes
08/12/21	1	Internal Inspection	5	Yes
09/12/21	2	Internal Inspection	8	Yes
10/12/21	1	Internal Inspection	3	Yes
13/12/21	2	Internal Inspection	10	Yes
14/12/21	1	Internal Inspection	2	Yes
14/12/21	1	ER Inspection	12	N/A
15/12/21	1	Internal Inspection	0	N/A
16/12/21	1	AA Inspection	0	N/A
21/12/21	3	Internal Inspection	18	Yes
21/12/21	1	ER Inspection	13	Yes
22/12/21	1	Internal Inspection	9	TBC
Total	22	-	104	-



3.2. Weather

The total rainfall recorded during the reporting period was 110.4 mm with 10 days exceeding one millimetre of rain. One rain event exceeded the 85th percentile (33.1mm).

During the reporting period, there were 28 days where the maximum wind gust recorded was greater than 25km/hr, two days where the maximum wind gust recorded was greater than 50km/hr and one day where the maximum wind gust recorded was greater than 60km/hr. There was a total of 12 days where wind speeds greater than 25km/hr were forecast. On those days, a notification was issued to the construction team to alert them of the strong winds forecast, including direction for necessary controls to be implemented.

A summary of the weather observations and weather events during the reporting period of relevance to the Soil and Water Management Sub-plan and Air Quality Management Sub-Plan Trigger Action Response Plans (TARPs) are summarised in **Table 7-2**. A comparison between long term monthly means and recorded values can be found in **Figure 3-2**.

Detailed weather observation records for the reporting period are presented in **Appendix A-1**.

Table 3-2 Weather Summary and Trigger Weather Events for reporting period¹

Weather Event	Forecast	Observation
Minimum temperature	12.0°C	Data Unavailable
Maximum temperature	32.0°C	37.2°C
Total rainfall	116.8 mm	110.4 mm
Number of days with rain (>1mm)	15 days	10 days
>80 th percentile (25.8mm) rain events	1 event	1 event
>85 th percentile (33.1mm) rain events	1 event	1 event
Flood warning / events	No events	No events
>25km/hr wind ²	12 days	28 days
>50km/hr wind	No days	2 days
>60km/hr wind	No days	1 day

¹Weather summary based on data from the 26 November 2021 to 25 December 2021 (30 days).

²Wind data from Sydney Olympic Park AWS (Archery Centre) {station 066212}. Weather data from Parramatta North (Masons Drive) {station 066124}.

Note: Red text indicates observation greater than forecast.

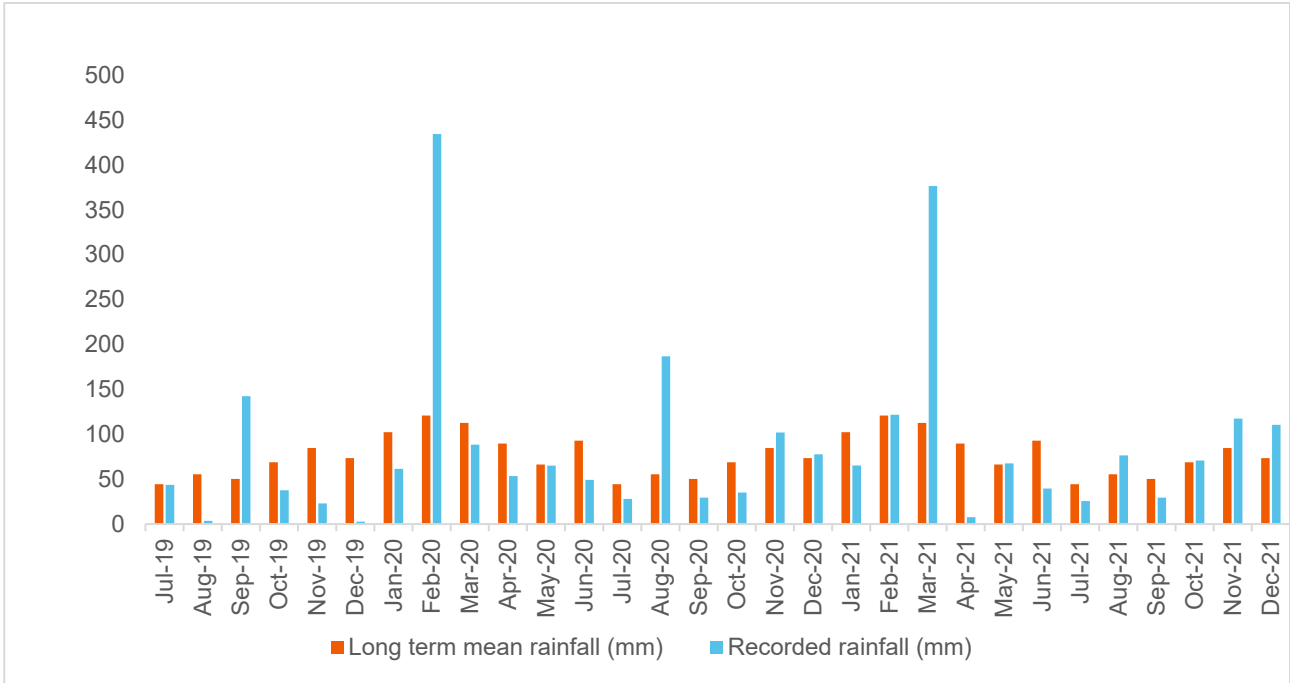


Figure 3-1 Monthly rainfall comparison

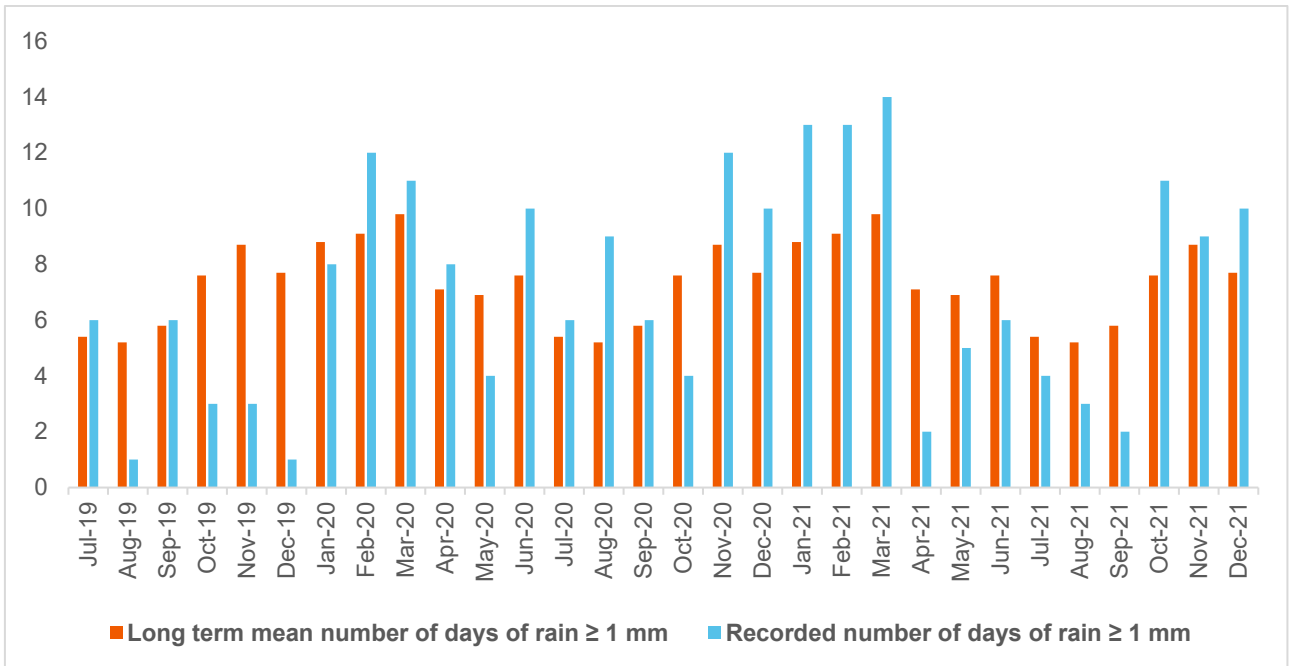


Figure 3-2 Monthly rain days comparison

3.3. Noise and Vibration

Table 3-3 provides a summary of noise monitoring events conducted during the reporting period. Detailed noise monitoring results and comments are presented in **Appendix A-2**. There was one exceedance of the predicted noise level ($L_{Aeq15min}$) during the reporting period. In this case, the monitoring activity documented the noise was not attributed to PLR activities.



Additional information on the hours of works, respite requirements and alternative accommodation is provided in the Noise and Vibration Management Sub-plan (Section 11.3).

Vibration monitoring events completed during the reporting period are summarised in **Table 3-4** and detailed in **Appendix A-2**. All vibration monitoring undertaken during the reporting period was conducted by the consultant Renzo Tonin. The report for these monitoring activities is still pending and as such these results are not included in **Table 3-4** and **Appendix A-2**.

All noise and vibration monitors available during the reporting period, together with current NATA calibration data, are provided in **Table 3-5**.

Continuous noise and vibration monitoring was undertaken during the reporting period at medical facilities in Westmead that have been identified as sensitive receivers. In consultation with the Health Administration Corporation, monitoring will be ongoing for 12 months. Locations of the noise and vibration monitors are provided in **Table 3-6**.

Table 3-3 Summary of Noise Monitoring for reporting period

Date	Monitoring Location	Attended/Continuous	Description
15/12/21	45 Macquarie Street	Attended	Pavement works
15/12/21	45 Macquarie Street	Attended	Asphalting
16/12/21	45 Macquarie Street	Attended	Rail grinding
20/12/21	8-12 Alexandra Avenue	Attended	Saw cutting
20/12/21	157 Hawkesbury Rd, Westmead	Attended	Saw cutting
20/12/21	199 Hawkesbury Rd, Westmead	Attended	Trackworks
20/12/21	Cumberland Hospital East	Attended	Earthworks
20/12/21	55 O'Connell St, North Parramatta	Attended	Trackworks
20/12/21	St Patricks Cemetery, North Parramatta	Attended	Trackworks
20/12/21	20 Victoria Rd, Parramatta	Attended	Concrete works
20/12/21	Arthur Phillip High School, Parramatta	Attended	Trackworks
20/12/21	9 Noller Pde, Parramatta	Attended	Trackworks
20/12/21	14 Dudley St, Rydalmere	Attended	Finishing works
20/12/21	Dundas Station	Attended	Finishing works
26/06/2020 -ongoing	Westmead Institute for Medical Research (Sleep Lab)	Continuous	General construction
26/06/2020 -ongoing	Westmead Institute for Medical Research (Brain Dynamics Centre)	Continuous	General construction
26/06/2020 -ongoing	Children's Medical Research Institute (Microscopy Labs)	Continuous	General construction
26/06/2020 -ongoing	Cumberland Hospital (Clinical psychology rooms)	Continuous	General construction



Table 3-4 Summary of Vibration Monitoring for reporting period

Date	Monitoring Location	Attended/Continuous	Description
26/06/2020	Westmead Institute for Medical Research (HAL incubators)	Continuous	General construction
26/06/2020	Westmead Institute for Medical Research (Microscopy Labs)	Continuous	General construction
26/06/2020	Children's Medical Research Institute (Microscopy Labs)	Continuous	General construction

Table 3-5 Noise and Vibration Monitors and NATA Calibration

Equipment	Serial Number	Calibration Date
Noise Level Meter	00973277	2/12/2022
Noise Level Meter	00661732	01/06/2022
Noise Level Meter	00973275	17/12/2022
Vibration Monitor	BE14639	10/02/2023
Vibration Monitor	BE17441	14/07/2022

Table 3-6 HAC Noise and Vibration Monitor Locations

Organisation	Monitor Type	Location
Westmead Institute for Medical Reach	Vibration Monitor	HAL incubators
		Microscopy Labs
	Noise Monitor	Sleep Lab
Children's Medical Research Institute	Vibration Monitor	Brain Dynamics Centre
	Noise Monitor	Microscopy Labs
Cumberland Hospital	Noise Monitor	Labs (Level 1)
		Clinical psychology rooms

Note: The calibration of the monitoring equipment is checked in the field before and after the noise measurement period per Standards Australia AS/IEC 60942:2004/IEC 60942:2003–Electroacoustic – Sound Calibrators.

3.4. Soil and Water

3.4.1. Water quality in receiving waters

A pre-construction investigation to establish water quality objectives for the project is included within the EIS Technical Paper 6 – Water Quality Assessment.

During the reporting period, dry weather monitoring was undertaken summarised in **Table 3-7** and detailed in **Table A-3-1**. Water levels were medium during the wet sampling. Overall, there was a moderate to large amount of debris or leaf litter present. All results were within the water quality objectives during the reporting period.



Table 3-7 Water Quality in Receiving Waters

Date	Type	Type of Results	Wet / Dry	Locations
17/12/21	Monitoring during construction	Laboratory	Dry	A'becketts Creek: AC1, AC2 Clay Cliff Creek: CC1, CC2 Domain Creek: DC1 Parramatta River: PR1, PR3, PR4, PR5, PR6 Subiaco Creek: SC1 Vineyard Creek: VY1 Parramatta River (PR2) was unable to be tested as the site was deemed inaccessible at the time of sampling. Vineyard Creek (VY2) was unable to be tested as the water level was too low to obtain a suitable sample.

Table 3-8 Water Monitor Calibration

Equipment ¹	Serial Number	Calibration Date
Water Quality Monitor	DV7F6E7J	23/07/2022

¹All equipment is calibrated by NATA standards.

3.4.2. Discharge and dewatering

There were no discharge events during the reporting period.

3.5. Air Quality

3.5.1. Dust Deposition Monitoring

A dust deposition gauge was installed at 13A Grand Avenue in Camellia in December 2019 in advance of works which commenced at the beginning of February 2020. Baseline data indicated that the value of Total Insoluble Matter (TIM) was 3.9 g/m² before the commencement of construction activities at 13A Grand Avenue.

Additional dust gauges were progressively installed at Rydalmere Station, Dundas Station, Carlingford and Telopea in advance of large-scale earthworks. As of November 2021, the gauges at Carlingford, Telopea and 13A Grand Avenue have been removed following conclusion of large-scale earthworks.

From December 2020 onwards, results have been presented as both TIM and Ash Content. The Ash Content method of analysis involves burning the TIM in a furnace to rid the sample of combustible materials such as vegetative matter, coal and insects. The remaining non-combustible material is then weighed to provide a more accurate dust monitoring result.

Dust deposition results are summarised in **Table A-4-1** in **Appendix A-4**, noting that data is received one month in arrears. All results from the previous reporting period had a satisfactory level of TIM with the exception of Rydalmere which was recorded at 4.1 g/m². While the recorded Ash Content of Rydalmere was



below the trigger, dust management controls were reviewed at the site and the use of the water cart was subsequently increased.

3.5.2. Asbestos Fibre Monitoring

Asbestos air monitoring is completed in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003(2005)], with NATA certification applying to all sample collection, handling and analytical procedures.

Asbestos Fibre Monitoring results are summarised in **Table A-4-2** in **Appendix A-4**. All reported results were satisfactory and conform with the minimum action level of <0.01 fibres /mL for control monitoring as outlined in Work, Health and Safety (2017) Regulation; and SafeWork NSW (2019) Code of Practice – How to Safely Remove Asbestos.

3.6. Flora and Fauna

3.6.1. Grey-Headed Flying Fox Monitoring

A Grey-Headed Flying Fox (GHFF) camp is located in Parramatta Park which lies approximately 150m from the project boundary at the nearest point.

Under Condition of Approval C9, a GHFF Construction Monitoring Program has been developed by TfNSW. The requirements of this Program have been reflected in the Flora and Fauna Management Sub-plan and include visual inspections on a weekly basis during the ‘high risk’ months of September to January. If distress is observed within the camp, immediate notification must be provided to TfNSW.

In addition, as required by the Environmental Work Method Statement for Bridge Road Bridge, a trained ecologist from Narla Environmental is required to undertake additional inspections of the camp during bridge piling works (**Table 3-9**).

During the reporting period, no indicators of stress or abnormal behaviour were observed during inspections.

Table 3-9 Observations from Visual Monitoring of Grey Headed Flying Fox Camp

Date	Time	Weather Conditions	Works	Notification on Triggers ¹	Comments
03/12/21	12:30	Sunny	Bridge Rd material movements	No	No disturbance identified.
17/12/21	15:03	Sunny	Bridge Works	No	No disturbance identified.

¹Notification triggers include: >50% of the roost takes flight for over 20 minutes, GHFF leaving the roost in daylight hours, unusual vocalisations, located on or 2m from the ground, panting, saliva spreading, adults moving away from young, GHFF injured or killed on site (including aborted fetuses).

3.7. Issues/incidents/non-compliance

Table 3-10 provides a summary of environmental compliance during the reporting period. There were no environmental incidents or non-compliances identified during the reporting period.



Table 3-10 Issues/incidents/non-compliances

Date	Location	Description
-	-	-



Appendices

A-1 Weather Observations

Table A-1-1 Weather Observations: Parramatta North (Masons Drive) {station 066124}.

Date	Temperatures		Rain mm	Temp °C	RH %	9:00 AM		
	Min	Max				Cld 8th	Dir	Spd km/h
	°C*	°C						
26/11/2021		19.5	34	17	98	8	SE	9
27/11/2021		18.2	21.2	15.2	98	8	SSW	22
28/11/2021		19.2	1.4	17.8	71	8	SSW	15
29/11/2021		23.6	0.4	18	68	8	SW	2
30/11/2021		23	0	20	81	8	SE	2
1/12/2021		25	0.4	22.8	79	7	NE	4
2/12/2021		28.3	0	23.2	77	7	NE	6
3/12/2021		30	0	24.8	71	1	W	6
4/12/2021		19	0.2	19.4	88	8	S	9
5/12/2021		19.4	1.6	16.5	90	8	S	6
6/12/2021		21.7	0.6	19.2	60	8	E	2
7/12/2021		27	0	19.6	82	8	N	4
8/12/2021		20.5	1	17.8	82	8	S	9
9/12/2021		24.3	9.2	19.1	91	6	SW	4
10/12/2021		20.3	20.6	19.5	58	6	WSW	7
11/12/2021		21.5	11	18.2	65	7	WSW	6
12/12/2021		22.8	0	19	72	6	S	4
13/12/2021		25	0	19.3	73	4	SSE	6
14/12/2021		26.2	0	21.4	70	6	WNW	2
15/12/2021		34	0	22.2	71	0	NW	4
16/12/2021		25.8	2.8	22.2	81	7	SE	6
17/12/2021		26.5	0	20.2	83	8	SW	2
18/12/2021		37.2	0	23	67	6	NNE	2
19/12/2021		34.7	3.6	28.2	64	7	NNW	9
20/12/2021		30	0.4	23.5	75	7	SSE	4
21/12/2021		32.3	0	25.5	65	0	SW	6
22/12/2021		27	0	22.5	78	8	SE	6
23/12/2021		26.8	0.8	22.4	91	8	S	2
24/12/2021		27.5	1.2	21	86	8	SSE	6
25/12/2021	19	31.6	0	25.4	69	3	N	4

Notes: *Data was unavailable



Table A-1-2 Wind Observations: Sydney Olympic Park AWS (Archery Centre) {station 066212}.

Date	Maximum Wind Gusts			9:00 AM		3:00 PM	
	Direction	Speed	Time	Direction	Speed	Direction	Speed
		km/h	local		km/h		km/h
26/11/2021	SSE	48	21:27	S	11	S	24
27/11/2021	SSW	44	9:59	S	9	SSE	20
28/11/2021	SSE	37	9:03	SSE	20	SSE	20
29/11/2021	ESE	28	17:38	W	6	E	9
30/11/2021	E	20	11:30	Calm		ESE	11
1/12/2021	E	28	12:55	NNE	2	E	15
2/12/2021	E	31	16:29	ENE	2	E	15
3/12/2021	SE	44	13:30	WNW	9	SSE	24
4/12/2021	S	39	15:59	SSE	9	SSE	19
5/12/2021	ESE	33	12:34	SW	6	SE	17
6/12/2021	NE	20	13:30	ENE	2	E	11
7/12/2021	E	33	15:12	NW	4	E	17
8/12/2021	SSE	28	2:30	S	13	SSE	17
9/12/2021	SE	31	15:07	E	2	SE	17
10/12/2021	WNW	39	23:58	NW	17	WNW	13
11/12/2021	SSE	41	17:14	WSW	11	S	15
12/12/2021	SE	35	13:58	SW	6	SE	22
13/12/2021	ESE	31	14:13	SW	7	ESE	15
14/12/2021	E	28	15:54	E	2	E	17
15/12/2021	SSW	46	18:55	W	6	ESE	15
16/12/2021	SSE	39	13:56	S	13	SE	24
17/12/2021	E	31	17:16	Calm		E	15
18/12/2021	SW	56	22:18	N	9	NNW	7
19/12/2021	NW	83	17:37	N	11	W	24
20/12/2021	ESE	31	15:24	SE	13	E	15
21/12/2021	ESE	30	13:27	WSW	9	ESE	17
22/12/2021	SE	31	13:25	SE	9	ESE	19
23/12/2021	E	31	14:32	Calm		E	15
24/12/2021	SE	30	14:57	SSE	11	SE	11
25/12/2021	E	31	13:52	WNW	4	NE	13

Notes:

Blue text indicates a rain event greater than 1mm of rain.

The orange text indicates a rain event greater than the 80th percentile of 25.8mm, and a wind speed of greater than 25km/hr

Red text indicates a rain event greater than the 85th percentile of 33.1mm, and a wind speed greater than 50km/hr.

* Data was unavailable.

A-2 Noise and Vibration Monitoring Results

Table A-2-1 Noise Monitoring Results

Date	Time	Works Period	Construction Activity	Activity Location	Monitoring Location	NML (dBA)	Predicted (dBA)	Additional Mitigation Measures	L _{Amax}	Recorded L _{eq, 15min} (dBA)	Exceedance of Predicted (dBA)	Exceedance of Predicted	Comments
15/12/21	21:00	OOHW Period 1	Pavement Works	Marsden/Macquarie	45 Macquarie Street	48	84	PN, V, SN	75.6	59.8	-24.2	No	Construction noise is dominant noise source.
15/12/21	23:31	OOHW Period 2	Asphalting	Macquarie Street	45 Macquarie Street	48	80	PN, V, SN	92.5	76.8	-3.2	No	Construction noise is dominant noise source.
16/12/21	23:40	OOHW Period 2	Rail Grinding	Church/Macquarie	45 Macquarie Street	48	66	PN, V, SN	84.5	60.9	-5.1	No	Construction noise is dominant noise source.
20/12/21	8:37	Standard Hours	Saw Cutting	Railway Parade	8-12 Alexandra Avenue	59	63	-	86.7	68.4	+5.4	Yes	Monthly verification noise monitoring. Construction noise inaudible. Traffic is dominant noise source including bus and train.
20/12/21	9:01	Standard Hours	Saw Cutting	Hawkesbury Road	157 Hawkesbury Rd, Westmead	61	87	-	99.4	72.6	-14.4	No	Monthly verification noise monitoring. Construction noise is dominant noise source.
20/12/21	9:29	Standard Hours	Trackworks	Hawkesbury Road	199 Hawkesbury Rd, Westmead	59	73	-	75.3	60.5	-12.5	No	Monthly verification noise monitoring. Construction noise is dominant noise source.
20/12/21	10:06	Standard Hours	Earthworks	Bunya East	Cumberland Hospital East	59	72	-	75.6	56.4	-15.6	No	Monthly verification noise monitoring. Construction noise is dominant noise source.
20/12/21	12:23	Standard Hours	Trackworks	Factory/O'Connell	55 O'Connell St, North Parramatta	52	72	-	83.6	69.0	-3.0	No	Monthly verification noise monitoring. Construction noise audible at most times. Traffic is dominant noise source.
20/12/21	11:53	Standard Hours	Trackworks	Church/Pennant Hills Road	St Patricks Cemetery, North Parramatta	61	71	-	83.9	62.5	-8.5	No	Monthly verification noise monitoring. Construction noise audible at most times. Traffic is dominant noise source.
20/12/21	11:23	Standard Hours	Concrete works	Church Street	20 Victoria Rd, Parramatta	69	76	-	80.1	68.1	-7.9	No	Monthly verification noise monitoring. Construction noise clearly audible. Traffic is dominant noise source.
20/12/21	16:41	Standard Hours	Trackworks	Macquarie Street	Arthur Phillip High School, Parramatta	68	74	-	79.6	56.0	-18.0	No	Monthly verification noise monitoring. Construction noise sometimes audible. Traffic and pedestrians are dominant noise source.
20/12/21	13:24	Standard Hours	Trackworks	George Street	9 Noller Pde, Parramatta	53	71	-	78.7	55.6	-15.4	No	Monthly verification noise monitoring. Construction noise audible at most times. Traffic is dominant noise source.
20/12/21	14:08	Standard Hours	Finishing Works	Dudley Street	14 Dudley St, Rydalmere	55	64	-	75.3	57.4	-6.6	No	Monthly verification noise monitoring. Construction noise inaudible. Traffic is dominant noise source.
20/12/21	14:36	Standard Hours	Finishing Works	Dundas	Dundas Station	55	77	-	75.4	66.5	-10.5	No	Monthly verification noise monitoring. Construction noise audible at most times. Non-PLR hammering nearby is dominant noise source.
26/06/2020 - ongoing	Continuous monitoring	Construction works	Hawkesbury Road works	Westmead Institute for Medical Research (Sleep Lab)		65	*	*	*	*	*	No	Activities are reviewed in response to exceedance alerts. Where the exceedance is attributed to construction, a review is undertaken of works and plant/equipment or methodology is modified where necessary. No exceedances were attributed to Parramatta Connect construction activities.
26/06/2020 - ongoing	Continuous monitoring	Construction works	Hawkesbury Road works	Westmead Institute for Medical Research (Brain Dynamics Centre)		65	*	*	*	*	*	No	
26/06/2020 - ongoing	Continuous monitoring	Construction works	Hawkesbury Road works	Children's Medical Research Institute (Microscopy Labs)		65	*	*	*	*	*	No	

Date	Time	Works Period	Construction Activity	Activity Location	Monitoring Location	NML Predicted (dBA)	Predicted (dBA)	Additional Mitigation Measures	L _{Amax}	Recorded L _{eq, 15min} (dBA)	Exceedance of Predicted (dBA)	Exceedance of Predicted	Comments
26/06/2020 - ongoing		Continuous monitoring	Construction works	Cumberland Hospital	Cumberland Hospital (Clinical psychology rooms)	55	*	*	*	*	*	No	Continuous monitoring values are available on request.

¹Sound Pressure Level (SPL) used instead of NML

Notes:

Standard hours:

- a) All areas excluding Eat Street and Camellia – Monday to Friday 7:00 am to 7:00 pm. Saturday 8:00 am to 6:00 pm
- b) Eat Street (Church Street between Palmer Street and George Street) – Monday to Friday 7:00 am to 6:00 pm. Saturday 8:00 am to 12:00 pm
- c) Camellia, Rosehill and Rydalmere (east of James Ruse Drive to Victoria Road) – 24 hours a day and seven days a week provided that sensitive receivers are not affected by noise levels of greater than 5 dBA above the rating background level at any residence

OOHW Period 1 is defined as:

- a) 6:00pm to 10:00pm (evenings) Monday to Saturday
- b) 7:00am to 8:00am and 1:00pm to 10:00pm (day & evening) Saturday and
- c) 8:00am to 6:00pm Sunday and public holidays (days).

OOHW Period 2 is defined as:

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

Additional Mitigation Measures

- PN = Project Notification
- V = Verification Monitoring
- RP = Respite Period
- AA = Alternate Accommodation
- SN = Specific Notification / individual briefing or phone call
- DR = Duration Reduction
- RO = Project Specific Respite Offer

Table A-2-2 Vibration Monitoring Results

Date	Time	Works Period	Construction Activity	Activity Location	Monitoring Location	Trigger Value (mm/s)	95 th Percentile PPV (mm/s)	Maximum PPV (mm/s)	Exceedance of Target	Construction Vibration Exceedance	Comments
26/06/2020	Continuous monitoring	Hawkesbury Road works	Hawkesbury Road	Westmead Institute for Medical Research (HAL incubators)	0.1 mm/s	*	No	No	Activities are reviewed in response to exceedance alerts. Where the exceedance is attributed to construction, a review is undertaken of works and plant/equipment or methodology is modified where necessary.		
26/06/2020	Continuous monitoring	Hawkesbury Road works	Hawkesbury Road	Westmead Institute for Medical Research (Microscopy Labs)	0.1 mm/s	*	No	No	No exceedances were attributed to PLR construction activities.		
26/06/2020	Continuous monitoring	Hawkesbury Road works	Hawkesbury Road	Children's Medical Research Institute (Microscopy Labs)	0.1 mm/s	*	No	No	Continuous monitoring values are available on request.		



A-3 Water Sampling and Discharge Results

Table A-3-1 Water Quality Monitoring - Comments and observations

Location	Waterway	Upstream/ Downstream of Works	Type ³	Date	Time	pH	Elec. Conduct. (µS/cm)	Turbidity (NTU)	Comments and Observations
						5.5- 8.5 ²	LR ¹ : 125- 2200 ² E: None	6-50 ²	
AC1	A'becketts Creek	Upstream	Dry	17/12/2021	12:20	7.62	1610	3.1	Overcast weather, large amount of rubbish, slight turbidity, large amount of leaf litter and vegetation.
AC2	A'becketts Creek	Downstream	Dry	17/12/2021	12:07	8.20	881	4.0	Overcast weather, large amount of rubbish, slight turbidity, large amount of leaf litter and vegetation.
CC1	Clay Cliff Creek	Upstream	Dry	17/12/2021	13:12	8.02	10200	25.0	Overcast weather, large amount of rubbish, high level of turbidity, large amount of leaf litter and vegetation. CC1 is noted to be an estuarine environment and as such there is not a trigger value for electrical conductivity.
CC2	Clay Cliff Creek	Downstream	Dry	17/12/2021	13:00	8.16	8490	22.6	Overcast weather, large amount of rubbish, high level of turbidity, large amount of leaf litter and vegetation. CC2 is noted to be an estuarine environment and as such there is not a trigger value for electrical conductivity.
DC1	Domain Creek	Upstream	Dry	17/12/2021	14:45	8.06	772	9.2	Sunny weather, no rubbish, clear water, large amount of leaf litter and vegetation.
PR1	Parramatta River	Upstream	Dry	17/12/2021	15:20	7.60	481	3.0	Sunny weather, no rubbish, moderate turbidity, moderate amount of leaf litter and vegetation.
PR3	Parramatta River	Upstream	Dry	17/12/2021	16:15	7.83	423	8.0	Sunny weather, no rubbish, slight turbidity, minimal leaf litter and vegetation.
PR4	Parramatta River	Downstream	Dry	17/12/2021	16:33	7.63	445	6.5	Fine weather, no rubbish, slight turbidity, minimal leaf litter and vegetation.
PR5	Parramatta River	Upstream	Dry	17/12/2021	14:17	7.81	28200	3.9	Sunny weather, no rubbish, clear water, moderate amount of leaf litter and vegetation. PR5 is noted to be an estuarine environment and as such there is not a trigger value for electrical conductivity.

Location	Waterway	Upstream/ Downstream of Works	Type ³	Date	Time	pH	Elec. Conduct. (µS/cm)	Turbidity (NTU)	Comments and Observations
						5.5- 8.5 ²	LR ¹ : 125- 2200 ² E: None	6-50 ²	
PR6	Parramatta River	Downstream	Dry	17/12/2021	11:09	7.78	28100	2.8	Overcast weather, no rubbish, clear water, moderate amount of leaf litter and vegetation. PR6 is noted to be an estuarine environment and as such there is not a trigger value for electrical conductivity.
SC1	Subiaco Creek	Upstream	Dry	17/12/2021	11:30	7.98	17900	4.7	Overcast weather, moderate amount rubbish, clear water, large amount of leaf litter and vegetation. SC1 is noted to be an estuarine environment and as such there is not a trigger value for electrical conductivity.
VY1	Vineyard Creek	Upstream	Dry	17/12/2021	10:03	8.16	627	10.3	Sunny weather, no rubbish, slight turbidity, moderate amount of leaf litter and vegetation, low water level.

1. ANZECC Waterway types: Fresh water (PR1, PR2, PR3, PR4, VY1 and VY2); E: Estuarine (CC1, CC2, AC1, AC2, PR5, PR6 and SC1).
2. Trigger values were established by Parramatta Connect within the Pre-Construction Sampling (Baseline Review) Water Quality Monitoring Report (PLR11NF-CPBD-ALL-WA-RPT-000003). **Red text** indicates values outside of the baseline trigger values.
3. Charles Street Weir separates Parramatta River from up and downstream.

A-4 Air Quality Monitoring Results

Table A-4-1 Summary of Dust Deposition Data (Ash Content)

Date	Monitoring Location	Ash Content g/m ² /month	Total Insoluble Matter (g/m ² /month)
October	Rydalmere Station	3.3	4.1
October	Dundas Station	1.3	1.6

Red text indicates exceedance of the ash content trigger value 4.0 g/m²/month.



Table A-4-2 Summary of Asbestos Fibre Monitoring

Report Number	Date	Location	Start time	End time	Result (Fibres/Fields)	Result (Fibres/mL)
AMR345	8-Dec	GATE 22, ADJACENT ENTRY GATE, BOUNDARY FENCE	7:30	13:40	0/100	<0.01
AMR345	8-Dec	GATE 22, WEST BOUNDARY FENCE, NORTH WEST OF ENTRY GATE	7:33	13:43	0/100	<0.01
AMR345	8-Dec	GATE 22, EAST BOUNDARY FENCE	7:35	13:35	0/100	<0.01
AMR345	8-Dec	GATE 22, SOUTH WEST CORNER, BOUNDARY FENCE	7:37	13:37	0/100	<0.01
AMR345	8-Dec	GATE 22, ADJACENT RAIL LINE, BOUNDARY FENCE	7:40	13:39	0/100	<0.01
AMR345	8-Dec	GATE 22, ADJACENT JAMES HARDIE BRIDGE, BOUNDARY FENCE	7:43	13:45	0/100	<0.01
AMR345	8-Dec	MIDDLE GATE AREA, NORTH PORTION BOUNDARY FENCE	13:58	17:17	0/100	<0.01
AMR345	8-Dec	MIDDLE GATE AREA, CENTRAL PORTION, BOUNDARY FENCE	14:03	17:18	0/100	<0.01
AMR345	8-Dec	MIDDLE GATE AREA, SOUTH PORTION, BOUNDARY FENCE	14:07	17:23	0/100	<0.01