



ENVIRONMENTAL MONITORING REPORT, MARCH 2022

PARRAMATTA LIGHT RAIL INFRASTRUCTURE WORKS

11 April 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 February 2022 to 25 March 2022).

Table 2-1 Site activities during reporting period

Precinct	Site Activities
Westmead and North Parramatta	<ul style="list-style-type: none">– Ongoing utility, street lighting and Multi-Function Pole (MFP) installation– Traffic signal works– Track works, including grass track installation and rail grinding– Retaining wall and driveway works for property adjustment– Road pavement and finish works (kerb & gutter)– Urban design works (soft and hard landscaping)– Defect works.
Parramatta CBD	<ul style="list-style-type: none">– Utility works, including MFPs and low voltage property connections– Property adjustments on George Street– Track and road works on Church Street (North Lennox) and Tramway Avenue– Paving (track and footpaths) on Church Street, Macquarie Street, George Street and Alfred Street– Intersection works, including Macquarie Street/Smith Street and Market Street/Church Street, Hassall Street/Harris Street and George Street/Alfred Street– Traffic signal and footpath works on Macquarie Street and George Street– Defects and rectifications– Rail grinding– Urban design works (soft and hard landscaping)
Camellia and Carlingford line	<ul style="list-style-type: none">– James Ruse Drive Bridge track works– Traffic signal and defect works– Landscaping works– 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 February 2022 to 25 March 2022). Detailed monitoring results for each activity are presented in the appendices to this report.

3.1. Inspections

A total of four ER inspections and three AA inspections were completed during the reporting period in addition to 12 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
28/02/22	2	Internal Inspection	7	Yes
01/03/22	2	Internal Inspection	2	Yes
01/03/22	1	ER Inspection	2	Yes
01/03/22	1	AA Inspection	0	N/A
03/03/22	1	Internal Inspection	1	Yes
07/03/22	3	Internal Inspection	7	Yes
07/03/22	1	AA Inspection	4	Yes
10/03/22	1	Internal Inspection	2	Yes
10/03/22	1	ER Inspection	8	Yes
14/03/22	1	Internal Inspection	1	Yes
14/03/22	1	ER Inspection	2	Yes
17/03/22	1	Internal Inspection	3	Yes
21/03/22	1	AA Inspection	3	Yes
23/03/22	1	Internal Inspection	2	Yes
24/03/22	1	ER Inspection	9	Yes
Total	19	-	53	-



3.2. Weather

The total rainfall recorded during the reporting period was 459.2 mm with 17 days exceeding one millimetre of rain. Two rain events exceeded the 85th percentile (33.1mm).

During the reporting period, there were 21 days where the maximum wind gust recorded was greater than 25km/hr and no days where the maximum wind gust recorded was greater than 50km/hr. There was a total of 9 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	14.0°C	14.0°C
Maximum temperature	29.0°C	29.2°C
Total rainfall	453.8 mm	459.2 mm
Number of days with rain (>1mm)	22 days	17 days
>80 th percentile (25.8mm) rain events	4 events	2 events
>85 th percentile (33.1mm) rain events	3 events	2 events
Flood warning / events	4 warnings	1 event
>25km/hr wind ²	9 days	21 days
>50km/hr wind	No days	No days
>60km/hr wind	No days	No days

¹Weather summary based on data from the 26 February 2022 to 25 March 2022 (28 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.

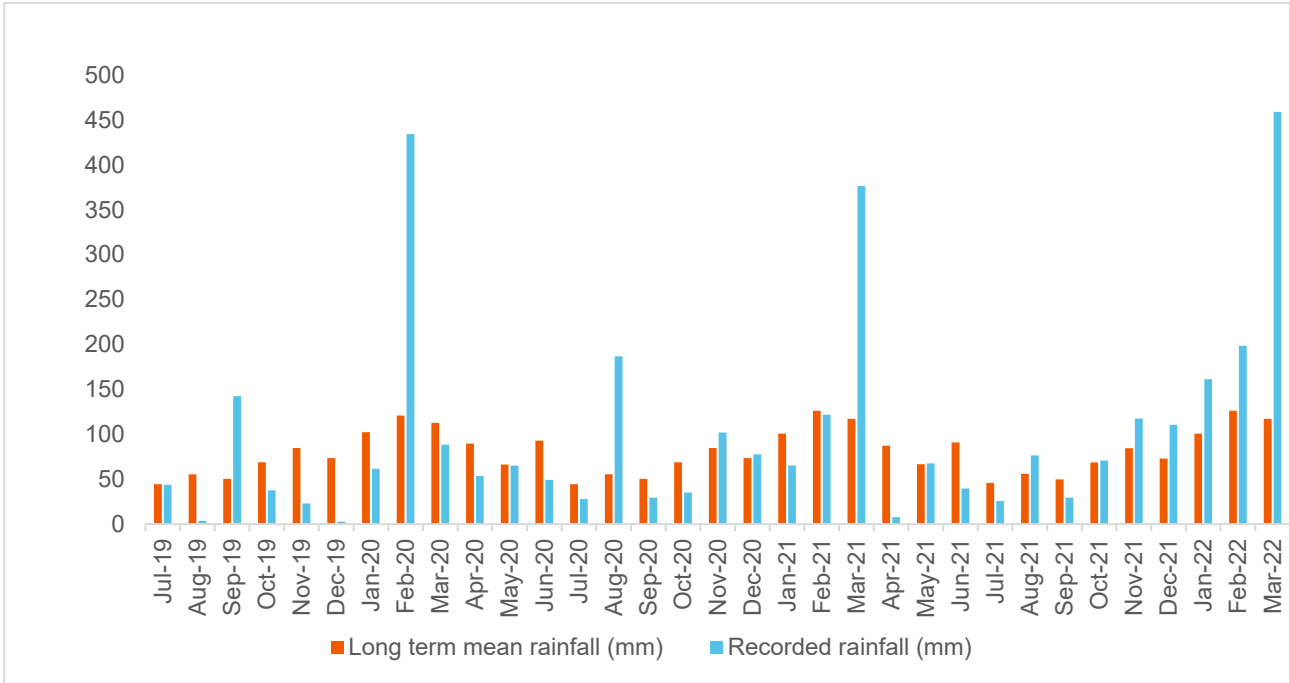


Figure 3-1 Monthly rainfall comparison

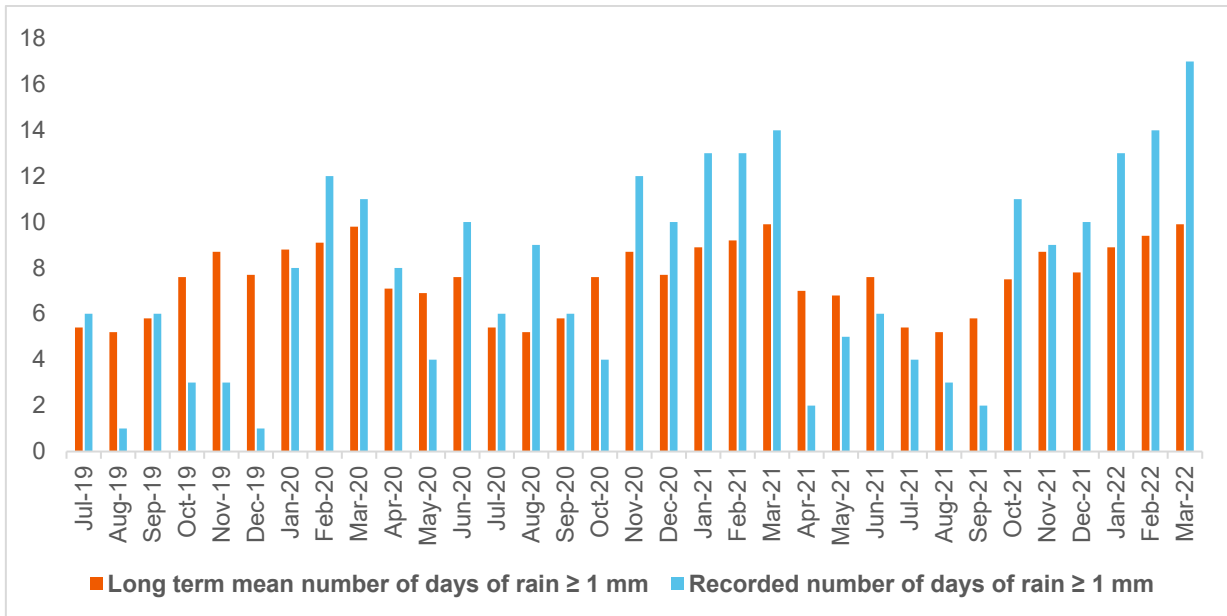


Figure 3-2 Monthly rain days comparison

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, including attended noise monitoring carried out by the noise and vibration consultant, Renzo Tonin. There were two exceedances of the predicted noise level ($L_{Aeq15min}$) during the reporting period. In both instances, Renzo Tonin assessed that PLR works were not attributed to the exceedances as construction noise was inaudible.



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**. During the reporting period, no attended vibration monitoring was undertaken.

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 (HAC), monitoring will be ongoing for 12 months. The locations of the noise and vibration monitors (provided in **Table 3-6**) and the trigger levels were developed by noise and vibration consultant Renzo Tonin in December 2019 (HAC Assessment System, 19 December 2019). In accordance with this report, trigger level alarms were set on each of the continuous noise and vibration monitors to mitigate the potential impact of construction works on sensitive laboratory equipment and/or medical services. The alarms are set to very stringent criteria and as such, can be triggered by both construction activities and hospital operations.

During the reporting period, all alarms were investigated by Parramatta Connect in consultation with HAC. Where the source of the alarm was determined to be construction activities, works were ceased and additional management measures were identified and implemented prior to recommencement of works.

Table 3-3 Summary of noise monitoring for reporting period

Date	Monitoring Location	Attended/Continuous	Description
10/03/2022	137 Arthur St, Parramatta	Attended	Monitored by Renzo Tonin: Lighting tower, light vehicles idling, handheld core drill, cable pulling
10/03/2022	101C James Ruse Drive, Parramatta	Attended	Monitored by Renzo Tonin: Lighting tower, light vehicles idling, handheld core drill, cable pulling
11/03/2022	104-106 Hassall St, Parramatta	Attended	Monitored by Renzo Tonin: Lighting tower, light vehicles idling, handheld core drill, excavator with bucket
11/03/2022	22 Victoria Rd, Parramatta	Attended	Hiab, hand tools, light vehicles, lighting tower
23/03/2022	101C James Ruse Drive, Parramatta	Attended	Concrete Truck
23/03/2022	104-106 Hassall St, Parramatta	Attended	Concrete Truck
23/03/2022	157 Hawkesbury Rd, Westmead	Attended	Trackworks
23/03/2022	199 Hawkesbury Rd, Westmead	Attended	Trackworks, Concrete Works and Sawcutting
23/03/2022	Cumberland Hospital East	Attended	Earthworks and Trackworks
23/03/2022	55 O'Connell St, North Parramatta	Attended	Trackworks
23/03/2022	St Patricks Cemetery, North Parramatta	Attended	Trackworks
23/03/2022	20 Victoria Rd, Parramatta	Attended	Earthworks and Trackworks
22/03/2022	Arthur Phillip High School, Parramatta	Attended	Trackworks



Date	Monitoring Location	Attended/Continuous	Description
22/03/2022	9 Noller Pde, Parramatta	Attended	Trackworks
23/03/2022	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
		Brain Dynamics Centre
Children's Medical Research Institute	Vibration Monitor	Microscopy Labs
	Noise Monitor	Labs (Level 1)
Cumberland Hospital	Noise Monitor	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.

Dry weather monitoring undertaken during the reporting period is summarised in **Table 3-7** and detailed in **Table A-3-1**. Water levels were low to medium during the dry sampling. Overall, there was a moderate amount of debris or leaf litter present. All results were within the water quality objectives during the reporting period except for CC1 and CC2 which exceeded the trigger value for turbidity. In this case, the downstream turbidity result was less than the upstream result due to third party works (non-Parramatta Connect). As such, the Site-Specific Trigger Value was not exceeded. Further details are presented in **Table A-3-1**. It is noted that Parramatta Connect have advised the City of Parramatta Council of the third party works.

Table 3-7 Water Quality in Receiving Waters

Date	Type	Type of Results	Wet / Dry	Locations
15/03/22	Monitoring during construction	Laboratory	Dry	Clay Cliff Creek: CC1, CC2 Parramatta River: PR3, PR4, PR5, PR6 Subiaco Creek: SC1
16/03/22	Monitoring during construction	Laboratory	Dry	Domain Creek: DC1 Parramatta River: PR1, PR2 A'becketts Creek (AC1, AC2) and Vineyard Creek (VY1, VY2) were inaccessible during the monitoring event.

Table 3-8 Water Monitor Calibration

Equipment ¹	Serial Number	Calibration Date
Water Quality Monitor	DV7F6E7J	23/07/2022
Water Quality Monitor	TN4DYW19	03/02/2023

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 were removed following conclusion of large-scale earthworks. In December 2021 and early January 2022, the gauges at Rydalmere Station and Dundas Station, respectively, were similarly removed. As such, the dust deposition monitoring program has concluded.

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-4-1** 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**). As these works have concluded, it was determined using the GHFF Mitigation Application Procedure that weekly visual inspections were not required for the reporting period.

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

Date	Time	Weather Conditions	Works	Notification Triggers ¹	Comments
-	-	-	-	-	-

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	Temp	RH	9:00 AM		
	Min	Max				Cld	Dir	Spd
	°C	°C	mm	%	8th			
26/02/2022	19.5	22.5	44	20.2	98	8	NE	2
27/02/2022	18.5	25.9	10	20	96	7	SW	2
28/02/2022	18.8	25.5	0.4	21.4	98	8	SSE	2
1/03/2022	19	23.4	12.2	20	98	8	E	2
2/03/2022	19.2	22	40	20.8	96	8	SE	11
3/03/2022	19.5	24.8	82	21.2	98	8	SSE	7
4/03/2022	20.5	26.4	27	22.5	99	7	SSE	9
5/03/2022	20.7	28	6.4	22.6	98	7	W	2
6/03/2022	19.4	24.7	26.6	21	98	8	SSE	2
7/03/2022	21	27.2	46	23.2	98	8	SSE	2
8/03/2022	21	22.2	56	21.2	98	8	SSW	6
9/03/2022	17.8	23.2	61	21	75	8	SSE	7
10/03/2022	14.8	25	0	18	81	2	SSW	6
11/03/2022	14.5	24.5	0	18.5	69	3	SSW	4
12/03/2022	14.8	24.8	0	18.2	74	7	SW	4
13/03/2022	14.5	24.4	0	17.5	77	7	WSW	4
14/03/2022	14.8	24.7	0	18.8	75	2	SW	2
15/03/2022	14	25.2	0.8	18.7	91	2	SSE	2
16/03/2022	17	24.7	8.2	18.9	93	8	SW	2
17/03/2022	16.2	28.2	17	19.2	98	6	SW	4
18/03/2022	18.8	29.2	0	21.4	86	6	SW	2
19/03/2022	18.8	22.8	12.4	19.2	98	8	SSE	6
20/03/2022	14.8	27	1.2	17.8	77	3	WSW	6
21/03/2022	17	26.4	0	18.8	81	6	SW	4
22/03/2022	15	27.5	0	19.4	82	3	SW	6
23/03/2022	18.4	25.5	0	22.5	68	6	SSE	6
24/03/2022	17	21.2	2	17.8	97	8	SW	6
25/03/2022	16.8	24.2	6	19	98	8	S	2



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
26/02/2022	E	31	19:25	Calm	*	E	11
27/02/2022	E	28	13:57	Calm	*	ESE	15
28/02/2022	E	35	15:11	Calm	*	SE	13
1/03/2022	ESE	43	12:44	ESE	17	ESE	19
2/03/2022	E	46	10:58	E	20	ESE	13
3/03/2022	SE	43	14:28	S	7	SSE	19
4/03/2022	SE	41	11:41	SSE	17	S	15
5/03/2022	NE	22	15:28	Calm	*	NE	7
6/03/2022	S	46	13:05	S	15	S	22
7/03/2022	SSE	35	3:27	SE	6	E	15
8/03/2022	SW	43	15:37	SSW	11	SW	9
9/03/2022	WSW	39	14:41	W	7	SSW	17
10/03/2022	SSE	35	14:09	SW	11	SE	13
11/03/2022	SE	28	15:07	WNW	9	SE	13
12/03/2022	E	31	16:13	WNW	4	E	15
13/03/2022	E	24	15:04	Calm	*	SE	15
14/03/2022	SE	35	13:19	WNW	2	SE	9
15/03/2022	ESE	33	15:57	Calm	*	ESE	17
16/03/2022	E	24	18:05	WNW	2	SE	9
17/03/2022	E	20	15:49	NW	7	E	11
18/03/2022	ESE	26	20:05	NNW	2	E	13
19/03/2022	SSE	35	12:48	SSW	7	SSE	20
20/03/2022	SE	24	14:01	WNW	4	SE	13
21/03/2022	SE	26	11:51	SW	6	ESE	13
22/03/2022	ESE	24	14:41	WNW	6	ESE	15
23/03/2022	SSE	35	12:32	SE	9	SE	20
24/03/2022	SE	20	23:02	Calm	*	E	6
25/03/2022	E	33	10:37	WSW	2	SSE	15

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
10/03/2022	23:12	OOHW Period 2	Lighting tower, light vehicles idling, handheld core drill, cable pulling	James Ruse Drive	137 Arthur St, Parramatta	46	51.0	-	81.0	54(44) ¹	+3.0	Yes	Monitored by Renzo Tonin. Construction noise from the James Ruse Drive roadworks was not audible at this monitoring location. Conversations from a member of public is dominant noise source.
10/03/2022	23:53	OOHW Period 2	Lighting tower, light vehicles idling, handheld core drill, cable pulling	James Ruse Drive	101C James Ruse Drive, Parramatta	46	54.0	-	66.0	53(43) ¹	-1.0	No	Monitored by Renzo Tonin. Construction noise from the James Ruse Drive roadworks was not audible at this monitoring location. Crickets and a generator from a nearby industrial premise are dominant noise sources.
11/03/2022	00:21	OOHW Period 2	Lighting tower, light vehicles idling, handheld core drill, excavator with bucket	James Ruse Drive	104-106 Hassall St, Parramatta	60	53.0	-	99.0	70(60) ¹	+17.0	Yes	Monitored by Renzo Tonin. Construction noise from the James Ruse Drive roadworks was not audible at this monitoring location. Traffic is dominant noise source.
11/03/2022	01:12	OOHW Period 2	Hiab, hand tools, light vehicles, lighting tower	Market Street	22 Victoria Rd, Parramatta	51	56.0	-	73.0	51.0	-5.0	No	Construction noise is dominant noise source.
23/03/2022	01:37	OOHW Period 2	Concrete Truck	James Ruse Drive	101C James Ruse Drive, Parramatta	46	73.0	-	63.7	54.3	-18.7	No	Construction noise sometimes audible. Crickets are dominant noise source.
23/03/2022	02:35	OOHW Period 2	Concrete Truck	James Ruse Drive	104-106 Hassall St, Parramatta	60	72.0	-	69.4	62.5	-9.5	No	Construction noise inaudible. Traffic is dominant noise source.
23/03/2022	14:02	Standard Hours	Trackworks	Hawkesbury Road	157 Hawkesbury Rd, Westmead	61	72	-	82.5	63.1	-8.9	No	Monthly verification noise monitoring. Traffic is dominant noise source.
23/03/2022	13:35	Standard Hours	Trackworks, Concrete Works and Sawcutting	Hawkesbury Road	199 Hawkesbury Rd, Westmead	59	77	-	86.8	63.8	-13.2	No	Monthly verification noise monitoring. Construction noise is dominant noise source.
23/03/2022	12:47	Standard Hours	Earthworks and Trackworks	Bunya East	Cumberland Hospital East	59	72	-	72.1	58.7	-13.3	No	Monthly verification noise monitoring. Construction noise is dominant noise source.
23/03/2022	12:17	Standard Hours	Trackworks	Factory/O'Connell	55 O'Connell St, North Parramatta	52	72	-	80.9	66.3	-5.7	No	Monthly verification noise monitoring. Traffic is dominant noise source.
23/03/2022	11:51	Standard Hours	Trackworks	Church/Pennant Hills Road	St Patricks Cemetery, North Parramatta	61	71	-	79.7	60.0	-11.0	No	Monthly verification noise monitoring. Traffic is dominant noise source.
23/03/2022	11:23	Standard Hours	Earthworks and Trackworks	Church Street	20 Victoria Rd, Parramatta	69	78	-	83.4	69.3	-8.7	No	Monthly verification noise monitoring. Construction noise is dominant noise source.
22/03/2022	14:13	Standard Hours	Trackworks	Macquarie Street	Arthur Phillip High School, Parramatta	68	74	-	72.2	62.0	-12.0	No	Monthly verification noise monitoring. Non-PLR construction noise is dominant noise source.
22/03/2022	14:54	Standard Hours	Trackworks	George Street	9 Noller Pde, Parramatta	53	71	-	74.5	56.3	-14.7	No	Monthly verification noise monitoring. Traffic is dominant noise source.
23/03/2022	10:51	Standard Hours	Finishing works	Dundas	Dundas Station	55	77	-	70.6	51.5	-25.5	No	Monthly verification noise monitoring. Construction noise sometimes audible.

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	Hawkesbury Road 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. Continuous monitoring values are available on request.
26/06/2020 - ongoing	Continuous monitoring	Construction works	Hawkesbury Road 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	Hawkesbury Road works	Children's Medical Research Institute (Microscopy Labs)	65	*	*	*	*	*	No	
26/06/2020 - ongoing	Continuous monitoring	Construction works	Cumberland Hospital	Cumberland Hospital	Cumberland Hospital (Clinical psychology rooms)	55	*	*	*	*	*	No	

¹Construction noise inaudible at the monitoring location. It was assumed that construction noise contribution is at least 10dB(A) less than measured.

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			
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. ($\mu\text{S}/\text{cm}$)	Turbidity (NTU)	Comments and Observations
						5.5- 8.5 ²	LR ¹ : 125- 2200 ² E: None	6-50 ²	
CC1	Clay Cliff Creek	Upstream	Dry	15/03/2022	11:17	8.34	1230	97.6	Sunny weather, no rubbish, extremely high turbidity, minimal leaf litter and vegetation. Exceedance of ANZECC Guideline Trigger Value for turbidity noted; location is upstream and not affected by Parramatta Connect works.
CC2	Clay Cliff Creek	Downstream	Dry	15/03/2022	11:39	8.24	1260	96.0	Sunny weather, large amount of rubbish, moderate turbidity, moderate amount of leaf litter and vegetation. Exceedance of ANZECC Guideline Trigger Value for turbidity noted; value is less than the upstream location (CC1).
DC1	Domain Creek	Upstream	Dry	16/03/2022	10:15	7.97	707	7.4	Sunny weather, no rubbish, slight turbidity, moderate leaf litter and vegetation.
PR1	Parramatta River	Upstream	Dry	16/03/2022	10:37	7.84	742	14.5	Sunny weather, no rubbish, slight turbidity, moderate leaf litter and vegetation.
PR2	Parramatta River	Downstream	Dry	16/03/2022	10:50	7.85	738	9.3	Sunny weather, no rubbish, slight turbidity, minimal leaf litter and vegetation.
PR3	Parramatta River	Upstream	Dry	15/03/2022	12:43	7.83	590	14.7	Sunny weather, no rubbish, moderate turbidity, minimal leaf litter and vegetation.
PR4	Parramatta River	Downstream	Dry	15/03/2022	12:25	7.88	622	19.6	Sunny weather, no rubbish, moderate turbidity, moderate leaf litter and vegetation.
PR5	Parramatta River	Upstream	Dry	15/03/2022	11:55	7.6	10400	6.4	Sunny weather, no rubbish, slight turbidity, minimal leaf litter and vegetation. PR5 is noted to be an estuarine environment and as such there is not a trigger value for electrical conductivity.
PR6	Parramatta River	Downstream	Dry	15/03/2022	9:48	7.62	8800	5.3	Sunny weather, moderate amount of rubbish, slight turbidity, large 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.


A-4 Air Quality Monitoring Results

Table A-4-1 Summary of Asbestos Fibre Monitoring


Report Number	Date	Location	Start time	End time	Result (Fibres/Fields)	Result (Fibres/mL)
AMR373	28-Feb	ALFRED ST WORK AREA, ADJACENT SOUTH GATE FENCELINE	8:06	15:00	0/100	<0.01
AMR373	28-Feb	ALFRED ST WORK AREA, 10 M NORTH OF SOUTH GATE FENCE LINE	8:10	15:01	0/100	<0.01
AMR373	28-Feb	ALFRED ST WORK AREA, SOUTH BOUNDARY FENCE LINE	8:11	15:03	0/100	<0.01
AMR373	28-Feb	ALFRED ST WORK AREA, SOUTH WEST CORNER FENCE LINE	8:12	15:05	0/100	<0.01
AMR373	28-Feb	ALFRED ST WORK AREA, 25 M NORTH WEST OF SOUTH GATE, FENCE LINE	8:15	15:08	0/100	<0.01
AMR374	1-Mar	ALFRED ST WORK AREA, ADJACENT SOUTH GATE FENCE LINE	7:43	10:08	0/100	<0.01
AMR374	1-Mar	ALFRED ST WORK AREA, 10 M NORTH OF SOUTH GATE, FENCE LINE	7:45	10:15	0/100	<0.01
AMR374	1-Mar	ALFRED ST WORK AREA, SOUTH BOUNDARY FENCE LINE	7:50	10:19	0/100	<0.01
AMR374	1-Mar	ALFRED ST WORK AREA, SOUTH WEST CORNER FENCE LINE	7:53	10:21	0/100	<0.01
AMR374	1-Mar	ALFRED ST WORK AREA, 25 M NORTH WEST OF SOUTH GATE, FENCE LINE	7:55	10:23	0/100	<0.01
AMR375	10-Mar	TRAMWAY AVE WORKSITE, NORTH EAST FENCING	7:38	15:08	0/100	<0.01
AMR375	10-Mar	TRAMWAY AVE WORKSITE, SOUTH EAST FENCING	7:40	15:10	0/100	<0.01



Report Number	Date	Location	Start time	End time	Result (Fibres/Fields)	Result (Fibres/mL)
AMR375	10-Mar	TRAMWAY AVE WORKSITE, SOUTH FENCING	7:41	15:12	0/100	<0.01
AMR375	10-Mar	TRAMWAY AVE WORKSITE, NORTH WEST CORNER	7:43	15:15	0/100	<0.01
AMR375	10-Mar	TRAMWAY AVE WORKSITE, NORTH FENCING	7:45	15:20	0/100	<0.01
AMR376	11-Mar	TRAMWAY AVE WORK SITE, NORTH EAST	7:23	14:10	0/100	<0.01
AMR376	11-Mar	TRAMWAY AVE WORK SITE,SOUTH EAST	7:25	14:12	0/100	<0.01
AMR376	11-Mar	TRAMWAY AVE WORK SITE, SOUTH FENCE	7:27	14:15	0/100	<0.01
AMR376	11-Mar	TRAMWAY AVE WORK SITE, NORTH FENCE	7:29	14:17	0/100	<0.01
AMR376	11-Mar	TRAMWAY AVE WORK SITENORTH EAST	7:31	14:19	0/100	<0.01
AMR377	14-Mar	WORK SITE, EAST FENCELINE BOUNDARY	7:16	15:15	0/100	<0.01
AMR377	14-Mar	WORKSITE, SOUTH EAST FENCE LINE BOUNDARY	7:18	15:17	0/100	<0.01
AMR377	14-Mar	WORKSITE, SOUTH FENCE LINE BOUNDARY	7:20	15:20	0/100	<0.01
AMR377	14-Mar	WORKSITE, NORTH WEST FENCE LINE BOUNDARY	7:22	15:23	0/100	<0.01
AMR377	14-Mar	WORKSITE, SOUTH WEST FENCELINE BOUNDARY	7:25	15:27	0/100	<0.01
AMR378	15-Mar	WORKSITE, EAST BOUNDARY FENCELINE	7:30	15:58	0/100	<0.01
AMR378	15-Mar	WORKSITE, SOUTH EAST BOUNDARY FENCELINE	7:32	16:01	0/100	<0.01
AMR378	15-Mar	WORKSITE, SOUTH BOUNDARY FENCELINE	7:35	16:03	0/100	<0.01
AMR378	15-Mar	WORKSITE, SOUTH WEST BOUNDARY FENCELINE	7:37	16:05	0/100	<0.01
AMR378	15-Mar	WORKSITE, NORTH WEST BOUNDARY FENCELINE	7:39	16:08	0/100	<0.01
AMR379	16-Mar	WORKSITE, EAST SIDE, TOP OF SIGNAGE	7:30	15:25	0/100	<0.01
AMR379	16-Mar	WORKSITE, SOUTH EAST FENCELINE	7:33	15:28	0/100	<0.01
AMR379	16-Mar	WORKSITE, SOUTH FENCELINE	7:35	15:30	0/100	<0.01
AMR379	16-Mar	WORKSITE, SOUTH WEST FENCELINE	7:37	15:31	0/100	<0.01
AMR379	16-Mar	WORKSITE, NORTH WEST FENCELINE	7:39	15:33	0/100	<0.01
AMR380	17-Mar	NORTH OF DRAINAGE EXCAVATION WORKS	7:30	13:25	0/100	<0.01



Report Number	Date	Location	Start time	End time	Result (Fibres/Fields)	Result (Fibres/mL)
AMR380	17-Mar	WEST OF DRAINAGE EXCAVATION WORKS	7:31	13:26	0/100	<0.01
AMR380	17-Mar	SOUTH OF DRAINAGE EXCAVATION WORKS	7:33	13:28	0/100	<0.01
AMR380	17-Mar	EAST OF DRAINAGE EXCAVATION WORKS	7:34	13:35	0/100	<0.01
AMR381	17-Mar	TRAMWAY AVE (WEST)- NORTH OF SANDSTONE EXCAVATION	7:15	13:04	0/100	<0.01
AMR381	17-Mar	TRAMWAY AVE (WEST)- SOUTH OF SANDSTONE EXCAVATION	7:17	13:06	0/100	<0.01
AMR382	18-Mar	TRAMWAY, NW CORNER OR WORKS AREA	7:14	12:06	0/100	<0.01
AMR382	18-Mar	TRAMWAY, NE CORNER OF WORK AREA	7:15	12:07	0/100	<0.01
AMR382	18-Mar	TRAMWAY, SE CORNER OF WORK AREA	7:16	12:08	0/100	<0.01
AMR382	18-Mar	TRAMWAY, SW CORNER OF WORK AREA	7:17	12:09	0/100	<0.01
AMR383	21-Mar	NW CORNER OF WORK AREA ON CHAIN LINK FENCE	7:22	14:26	0/100	<0.01
AMR383	21-Mar	NE CORNER OF WORK AREA ON CONCRETE BARRIER	7:23	14:27	0/100	<0.01
AMR383	21-Mar	SE CORNER OF WORK AREA ON CHAIN LINK FENCE	7:24	14:28	0/100	<0.01
AMR383	21-Mar	SW CORNER OF WORK AREA ON RAILING	7:25	14:29	0/100	<0.01
AMR384	22-Mar	WORKSITE, EAST SECTION, TOP OF SIGNAGE	7:12	15:00	0/100	<0.01
AMR384	22-Mar	WORKSITE, SOUTH OF BOUNDARY FENCELINE	7:14	15:02	0/100	<0.01
AMR384	22-Mar	WORKSITE, SOUTH WEST BOUNDARY FENCELINE	7:16	15:05	0/100	<0.01
AMR384	22-Mar	WORKSITE, NORTH WEST FENCELINE	7:18	15:08	0/100	<0.01
AMR385	23-Mar	WORKSITE, EAST SIDE, TOP OF SIGNAGE	7:12	15:00	0/100	<0.01
AMR385	23-Mar	WORKSITE, SOUTH EAST FENCELINE	7:14	15:03	0/100	<0.01
AMR385	23-Mar	WORKSITE, SOUTH WEST FENCELINE	7:16	15:05	0/100	<0.01
AMR385	23-Mar	WORKSITE, NORTH WEST FENCELINE	7:18	15:08	0/100	<0.01
AMR386	24-Mar	WORKSITE, EAST SIDE, TOP OF SIGNAGE	7:12	15:00	0/100	<0.01
AMR386	24-Mar	WORKSITE, SOUTH EAST FENCELINE	7:14	15:03	0/100	<0.01



Report Number	Date	Location	Start time	End time	Result (Fibres/Fields)	Result (Fibres/mL)
AMR386	24-Mar	WORKSITE, SOUTH WEST FENCELINE	7:16	15:05	0/100	<0.01
AMR386	24-Mar	WORKSITE, NORTH WEST FENCELINE	7:18	15:08	0/100	<0.01
AMR387	25-Mar	WORKSITE, EAST SIDE, TOP OF SIGNAGE	7:22	10:35	0/100	<0.01
AMR387	25-Mar	WORKSITE, SOUTH EAST FENCELINE	7:26	10:38	0/100	<0.01
AMR387	25-Mar	WORKSITE, SOUTH WEST FENCELINE	7:29	10:40	0/100	<0.01
AMR387	25-Mar	WORKSITE, NORTH WEST FENCELINE	7:35	10:43	0/100	<0.01
AMR387	25-Mar	WORKSITE, EAST SIDE, TOP OF CRATES	14:00	16:30	0/100	<0.01
AMR387	25-Mar	WORKSITE, SOUTH EAST SIDE FENCELINE	14:03	16:33	5/100	<0.01
AMR387	25-Mar	WORKSITE, SOUTH FENCELINE	14:05	16:35	0/100	<0.01
AMR387	25-Mar	WORKSITE, NORTH WEST FENCELINE	14:07	16:36	0/100	<0.01