ALBION PARK QUARRY

ANNUAL REVIEW

Period 01 July 2021 – 30 June 2022

TITLE BLOCK

Name of operation	Albion Park Quarry
Name of operator	Cleary Bros (Bombo) Pty Ltd
Development consent #	10639/2005
Name of holder of development consent	Cleary Bros (Bombo) Pty Ltd
Annual Review start date	1/7/2021
Annual Review end date	30/6/2022

I, Helen Cleary, certify that this audit report is a true and accurate record of the compliance status of the Albion Park Quarry for the period 1 July 2021 to 30 June 2022 and that I am authorised to make this statement on behalf of Cleary Bros (Bombo) Pty Ltd.

Note

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	Helen Cleary
Title of authorised reporting officer	Executive General Manager
Signature of authorised reporting officer	
Date	8/7/2022

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Annexures

Abbreviations

AR	Annual Review
CB	Cleary Bros (Bombo) Pty Ltd
DC	Development Consent 10639/2005
DP	Deposited Plan
DRG	Department of Resources and Geoscience of the Department
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPL	Environment Protection Licence
HVAS	High Volume Air Sampler
$L_{Aeq(15min)}$	Continuous Equivalent Noise Level for a 15 Minute Period
MW	Monitoring Well
QEMP	Quarry Environmental Management Plan
WMP	Water Management Plan

Internal Document Control

Version	Description	Prepared By	Reviewed By	Prepared Date
1	Initial Draft	M Hammond		8/7/2022
2	Final			

1. INTRODUCTION

1.1 Statement of Compliance

Were all conditions of the relevant approvals complied with?	
Development Consent #10639/2005	Yes
Environmental Protection Licence #299	No

1.2 Background

Cleary Bros (CB) has extracted and processed hard rock from a succession of quarries in the Albion Park area since the middle of last century. On 21 February 2006 the Land and Environment Court (LEC) granted development consent for the company to extend quarrying into a new area, about 400 metres south east from the then operating quarry.

Following negotiations with the adjacent land owner, Rinker (now Holcim), Shellharbour City Council on 10 May 2007 granted development consent for an access road linking the quarry extension with the existing haul road to Cleary Bros crushing plant. A short road crossing the approved quarry access road to maintain access to Holcim property from Dunsters Lane was also approved.

On 30 June 2009, a modification was approved to increase the maximum production from the quarry to 600,000 tonnes of quarry product per annum. On 25 June 2015, a second modification was determined and granted to increase the annual production to 900,000 tonnes of quarry products per annum. On 7 June 2017, a third modification was determined and granted to permit extraction from Stage 5 and 6 of the quarry. The 2017 modification of Development Consent 10639/2005 is hereafter referred to as the Development Consent or DC.

Operation of the hard rock quarry is licensed by the Environment Protection Authority (EPA) under Environmental Protection Licence 299. The Environmental Protection Licence (EPL) was most recently amended by the EPA on 8 December 2021 following the connection of the site to the town sewerage system, and the decommissioning of the on-site sewage treatment system. CB operates in accordance with the site's Quarry Environmental Management Plan (QEMP) consistent with the requirements of the court approval and EPL.

The location of the property is shown on Figure 1.

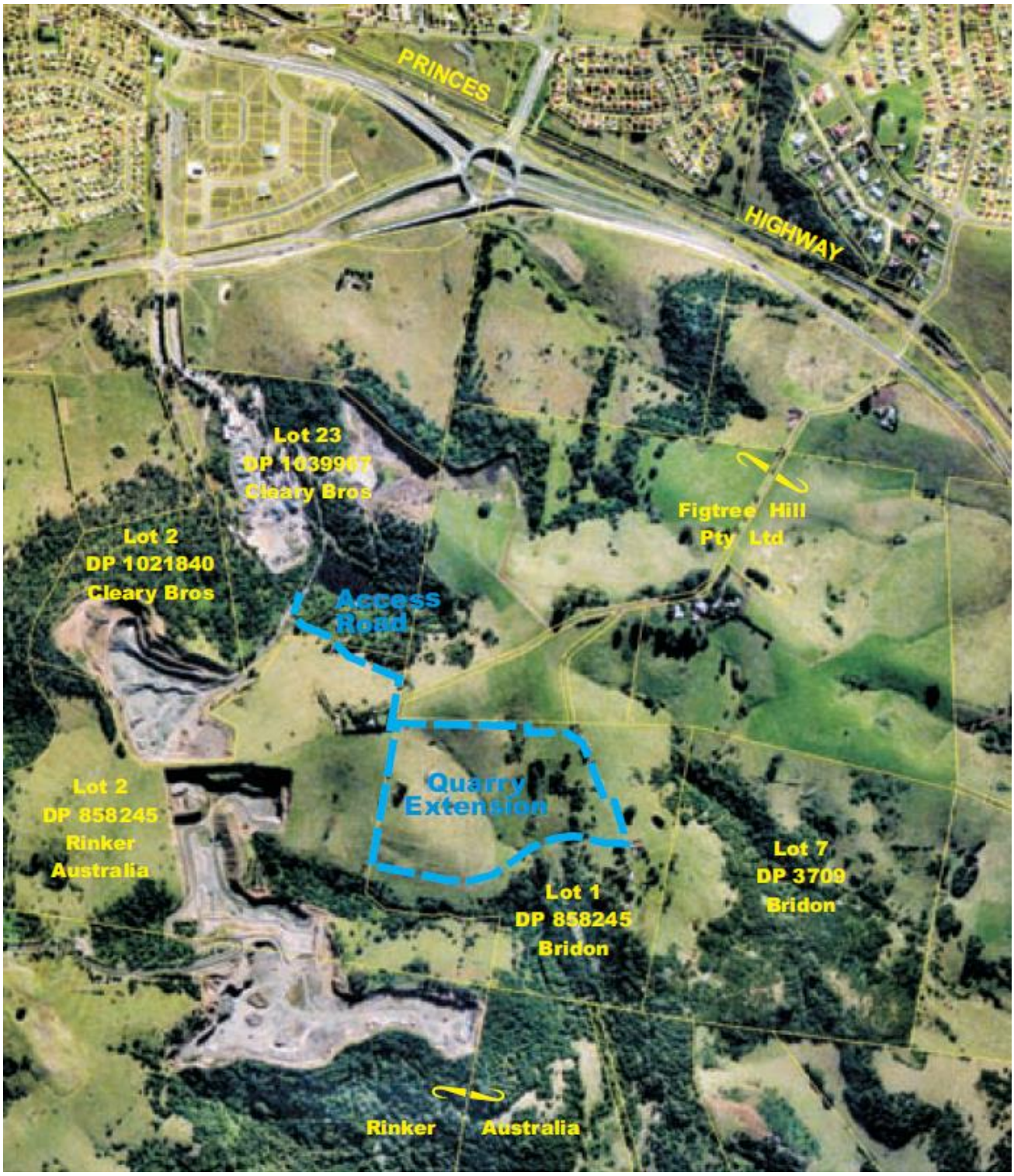


Figure 1 – Regional context and site boundaries

1.3 Objectives of the Annual Review

The objectives of this Annual Review are to satisfy the reporting requirements of the Development Consent as reproduced below:

Condition	Requirement	Where addressed
Schedule 3 Condition 9	The Applicant must: a) provide annual production data to the DRG using the standard form for that purpose; and b) include a copy of this data in the **Annual Review**.	Annexure A
Schedule 4 Condition 33	Each year, the Applicant must: • review the Water Management Plan; • update each sub-plan; and • report the results of this review in the **Annual Review**, Including: • the results of monitoring; • details of the review for each sub-plan; • amendments to the sub-plans; and • details of the measures undertaken/ proposed to address any identified issues.	Sections 3 & 5.1
Schedule 4 Condition 38	The Applicant must include a progress report on the implementation of the Vegetation Management Plan in the **Annual Review**.	Sections 3.7 & 5.3
Schedule 4 Condition 44	The Applicant must include a progress report on the Rehabilitation Management Plan in the **Annual Review**.	Section 3.7 & 5.4
Schedule 4 Condition 53	The Applicant must include a progress report on the Heritage Management Plan in the **Annual Review**	Section 5.5
Schedule 4 Condition 60	The Applicant must describe what measures have been implemented to minimise the amount of waste generated by the development in the **Annual Review.**	Section 5.6

Schedule 6 Condition 2	By the end of September each year, or other timing as may be agreed by the Secretary, the Applicant must submit a report to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. This review must: (a) describe the development (including rehabilitation) that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year; (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, which includes a comparison of these results against: • the relevant statutory requirements, limits or performance measures/criteria; • the monitoring results of previous years; and • the relevant predictions in the documents referred to in condition 2 of Schedule 3; (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance; (d) identify any trends in the monitoring data over the life of the development; (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and (f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.	This Document

2. SITE DESCRIPTION AND ACTIVITIES

2.1 Site Identification

The site comprises Lot 1 DP 858245 (active quarry) and Lot 23 DP 1039967 (processing plant, site entrance product storage and sale). The haul road connecting the quarry to the processing plant traverses Lot 2 DP 858245. Lot 1 is owned by Bridon Pty Ltd, a member of the Cleary Bros group of companies. Lot 23 is owned by CB and Lot 2 is owned by Holcim. The site is located within the City of Shellharbour. Access to the extraction area is from East-West Link Road via the processing plant. The land approved for extraction has an area of 16 hectares.

The quarrying process involves removing overburden from the hard rock resource, loosening the rock by blasting, excavating the broken basalt and loading to off-road trucks for delivery to the processing plant. At the processing plant hard rock is crushed, screened and classified into various products for stockpiling on site prior to sale and delivery. There are two layers of hard rock in the extraction area over a sandstone base. Backfilling of the western parts of the sandstone base has commenced using overburden extracted during the quarrying process.

2.2 Works Completed in Period

Normal quarry production was carried out during the reporting period of July 2021 to June 2022 and has continued across the base of the extraction area as shown on Figure 2. Quarrying in the current reporting period progressed to the eastern extent of the extraction area. Rehabilitation works continue in Stages 1, 2 and 4 of the quarry, with overburden material placed in these areas in general accordance with the Rehabilitation Management Plan. Primary planting commenced in previously reshaped parts of Stage 1 in 2021-22. Maintenance of existing plantings in the revegetation areas continued during the year.

2.3 Works to be completed in the Next Period

In the period July 2022 to June 2023 quarry extraction will continue in Stages 5 and 6 of the quarry. An Environmental Impact Statement has been submitted to access the hard rock resource to the east of the existing extraction area known as Stage 7. In the event Development Consent is received for this extension, preparatory works including service relocation, amenity bund construction, screen planting, and topsoil and overburden stripping may occur in accordance with an updated and approved QEMP.

2.4 Quarry Production

During the reporting period covered by this Annual Review, one annual return was forwarded to NSW Department of Regional NSW (formerly NSW Trade and Investment), covering the 12 months ending 30 June 2021. This return indicates a total of 776,078 tonnes of material was sold from the quarry, which includes 11,760 tonnes of concrete returns incorporated into Enviropave, as well as 434 tonnes of overburden, and which equates to the total hard rock extracted from the extended quarry area of 763,884 tonnes.

In the current reporting period, 440,858 tonnes of blue rock (basalt) and 244,489 tonnes of red rock (agglomerate) were extracted from the extension area and sold. The hard rock quarry products produced in the reporting period were below the maximum of 900,000 tonnes permitted under the current DC. An additional 535 tonnes of overburden and 17,509 tonnes of material produced from concrete returns were sold from the site during the reporting period.

A copy of the return up to 30 June 2021 to NSW Industry and Investment is included as Annexure A. The next annual return to NSW Department of Regional NSW is due by November 2022.

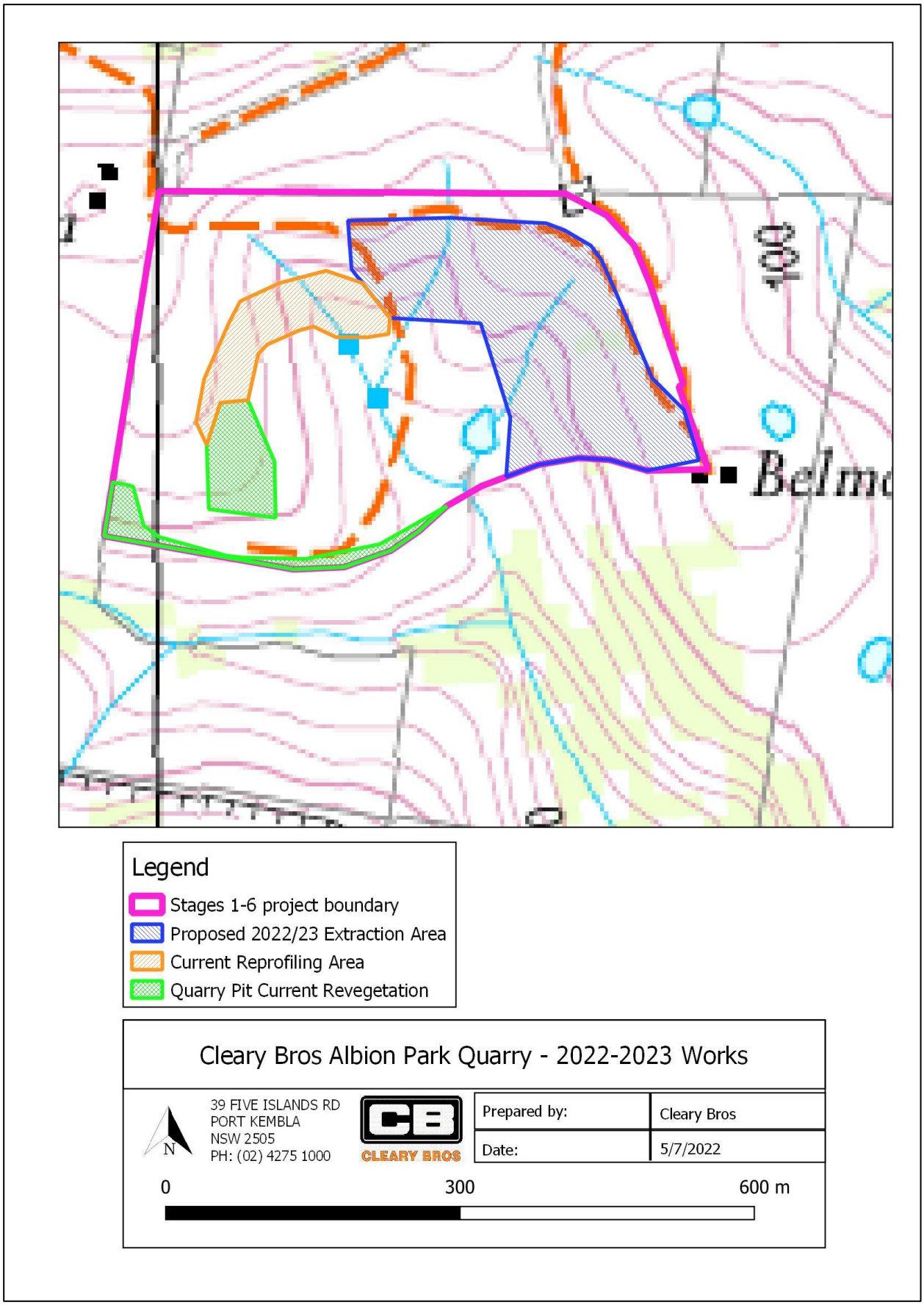


Figure 2 – Works Completed and Works Programmed

3. REVIEW OF ENVIRONMENTAL PERFORMANCE

This is the twelfth Annual Review submitted for the Albion Park Quarry following its extension into Lot 1 DP 858245. Monitoring data refers primarily to the reporting period from 1 July 2021 to 30 June 2022.

3.1 Meteorological Monitoring

3.1.1 Standards and Performance Measures

The Development Consent and Environmental Protection Licence require the monitoring of meteorological parameters on the site for the life of the project. Section 7.2 of the QEMP details the following parameters will be continuously monitored at the site and averaged over 10 minute intervals.

Parameter	Units
Temperature at 2 and metres	°C
Total Solar Radiation at 10 metres	W/m^2
Wind direction at 10 metres	degrees
Wind speed at 10 metres	m/s
Sigma theta at 10 metres	degrees
Rainfall	mm/hr

3.1.2 Environmental Performance

Cleary Bros operated a weather station for the duration of the current reporting period adjacent to the *Belmont* homestead, which has been in operation in this location since 2005. The weather station is capable of monitoring all of the parameters required by the QEMP, and can be contacted in near real time through the mobile telecommunications network. This data has been reviewed regularly throughout the current reporting period to ensure the continued functionality of the system. The weather station operated continuously during the reporting period, with only a minor loss of solar radiation data due to a broken wire in June 2022, which was quickly repaired.

Rainfall in the current reporting period has been significantly above average, with 2,170 mm recorded at the site weather station. Rainfall was heavily skewed to the first half of 2022, with a peak of 684mm recorded in March 2022 and 319mm in February 2022. Other months with rainfall totals well above average included August (217mm) and May (199mm). Meanwhile, June (26mm), July (46mm), and September (51mm) recorded rainfall totals significantly below average. To allow a comparison with long term average precipitation, rainfall recorded in the current year at the closest Bureau of Meteorology (BOM) site (Albion Park Shellharbour Airport) has been compared to the long term average for the nearest BOM site with an extended record (Albion Park Post Office). 1,928 mm was recorded at the BOM Albion Park (Shellharbour Airport) weather station compared with a long term average of 1,105 mm for Albion Park (Albion Park Post Office). This shows that the region experienced rainfall significantly above the long term average in the current reporting year, which has largely overcome the rainfall deficit experienced due to the 2017-2019 drought.

The graph below shows the total rainfall recorded each month at the site weather station as well as the cumulative rainfall deficit experienced since July 2017. The cumulative rainfall deficit has been calculated by comparing the monthly rainfall recorded at the BOM Albion Park (Shellharbour Airport) weather station against the long term average for Albion Park (Bowling Club). This shows the period of above average rainfall since June 2020, with the extensive rainfall in the first half of 2022 restoring the rainfall deficit to neutral. The extensive rainfall in February and March 2022 resulted in flooding across many coastal parts of NSW, with a Disaster Declaration issued for Shellharbour City Local Government Area (LGA) (amongst many other LGA's) at the time. This rainfall period has influenced many of the water monitoring results during the reporting period, as will be described in the following sections.

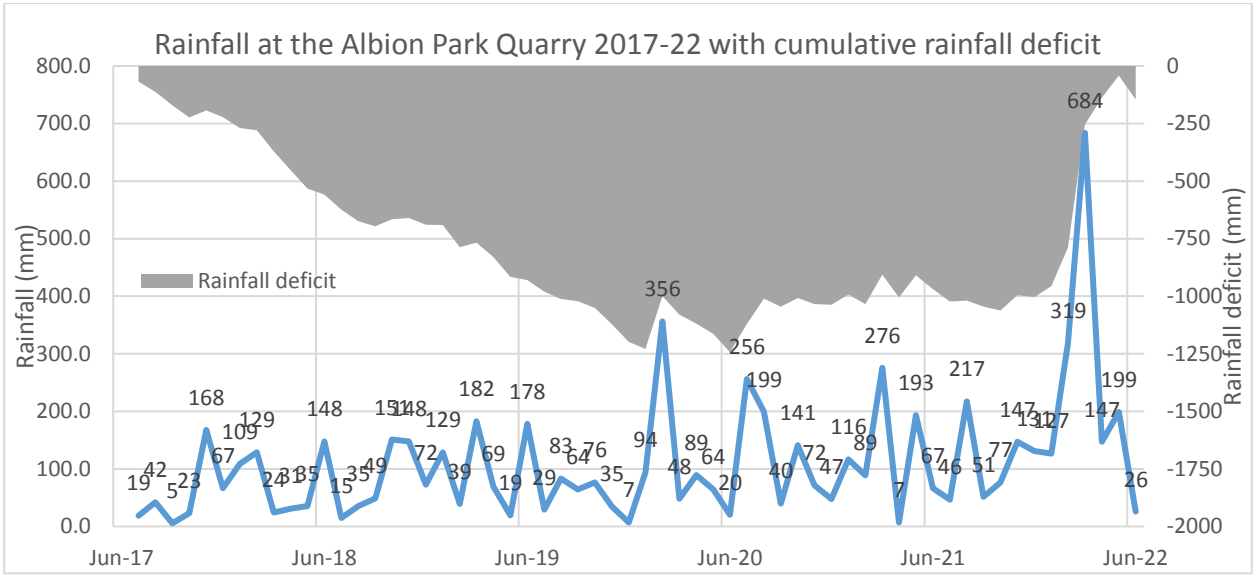


Figure 3 – Rainfall measured on site FY18-FY22, with the cumulative rainfall deficit for Albion Park shown

3.1.3 Compliance Assessment

The weather station was operated well throughout the reporting period, demonstrating compliance with this requirement.

3.2 Groundwater Management

3.2.1 Standards and Performance Measures

There are no groundwater monitoring requirements in the EPL.

The DC requires the implementation of a Water Management Plan (incorporating a Groundwater Monitoring Program), which outlines the monitoring requirements related to groundwater management. The Water Management Plan was most recently revised and approved on 12 March 2021. The current groundwater monitoring program requires the biannual sampling of the four groundwater monitoring bores within the network for a range of parameters, as described in the table below. This monitoring was increased to a monthly frequency for six months from August 2020, in response to uncertainties in groundwater behaviour identified in the previous Annual Review. The sampling was reduced back to a quarterly frequency after the January 2021 sampling round.

Analyte	Units
Water level	mbgl
Electrical Conductivity	µS/cm
Total Dissolved Solids	mg/L
pH	pH units
Alkalinity	mg/L
Temperature	°C
Total Suspended Solids	mg/L
Major Cations (Na, K, Ca)	mg/L
Major Anions (SO4, Cl)	mg/L
Nitrogen species (NO3, NH3, TKN)	mg/L
Total Phosphorus	mg/L

Analyte	Units
Oil and Grease	mg/L
BOD; TOC	mg/L
Dissolved Metals (Cu, Fe, Ni, Zn)	mg/L

Furthermore, where the electrical conductivity of the bore exceeds specific levels (as described in the table below), the sampling suite will be extended to include additional dissolved metals for analysis (As, Cd, Cr, Pb, Hg). There are no groundwater quality criteria in the DC, with the aim of the groundwater monitoring program to assess any impacts from quarrying on groundwater quality and quantity.

Monitoring Bore	EC trigger level for additional analysis
MW1S	1600
MW1D	1300
MW2S	1300
MW2D	1800

The EIS for the Albion Park Quarry predicted that the quarrying operations would have little impact on flows in the eastward flowing creek (from Holcim), however as quarrying progressed, an increasing proportion of the catchment of the southward flowing creek would be intercepted. Groundwater bores would be monitored to provide groundwater flow information from the various levels in the strata. The two boreholes MW1 and MW2 provide this information through a shallow and deep borehole at each location and the depths are currently monitored quarterly. The results are described below.

3.2.2 Environmental Performance

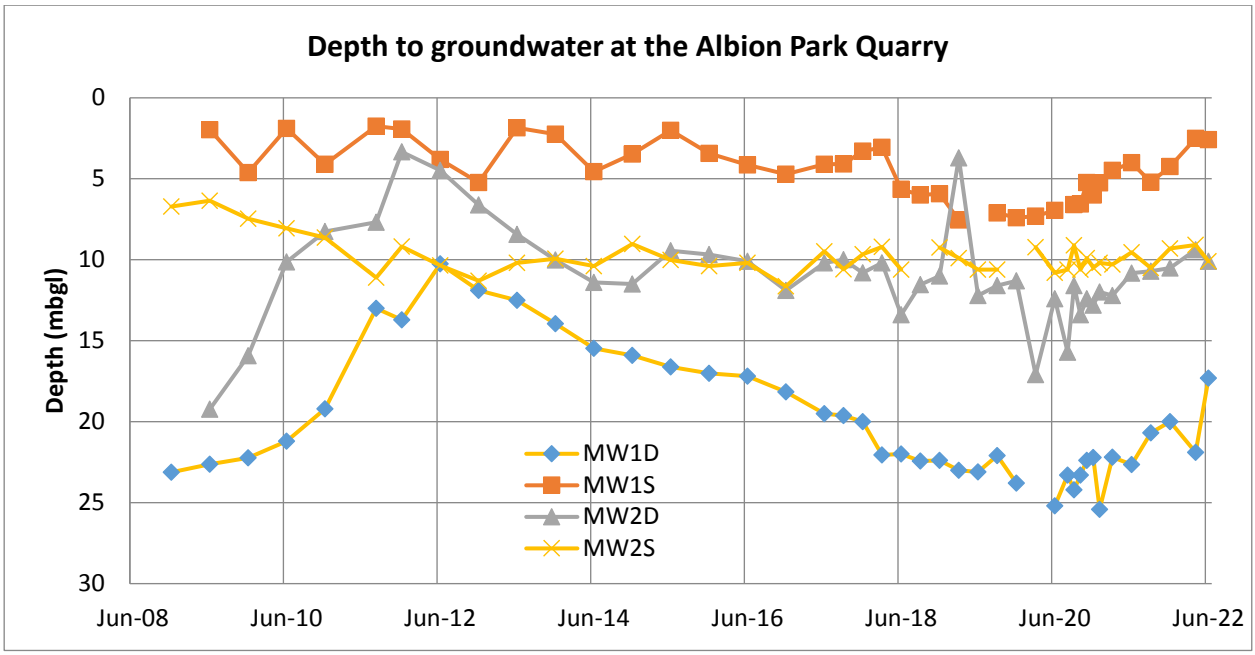
CB has implemented the Groundwater Monitoring Program at the Albion Park Quarry, with the two shallow and two deep groundwater monitoring bores measured quarterly each during the reporting period for the parameters listed in the table above. MW1S and MW2S represent the shallow groundwater monitoring bores, screened between 4 and 11 metres and 6 and 13 metres respectively below ground level. Monitoring bores MW1D and MW2D represent the deep groundwater monitoring bores located adjacent to the respective shallow bores, and are both screened between 18 and 25 metres below ground level. The bores are located down gradient to the south of the quarry as shown on Annexure B.

3.2.3 Groundwater Monitoring Results

A summary of groundwater monitoring results for the period is displayed in this section, separated into analyte groupings monitored under the Water Management Plan. For each analyte, the range and average of the current period's monitoring are tabulated, alongside the historical range and average. For each analyte, a graph is also included showing the historical variations in measurements for each groundwater bore since establishment. As no criteria are specified for groundwater level or quality in the EIS or Development Consent, no comparison is available in relation to groundwater monitoring.

Depth (mbgl)

BORE HOLE	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	17.3	19.98	21.9	10.26	19.86	25.41
MW1S	2.5	3.64	5.22	1.75	4.52	7.55
MW2D	9.38	10.17	10.7	3.34	10.93	19.22
MW2S	9.08	9.75	10.5	6.35	9.77	11.64

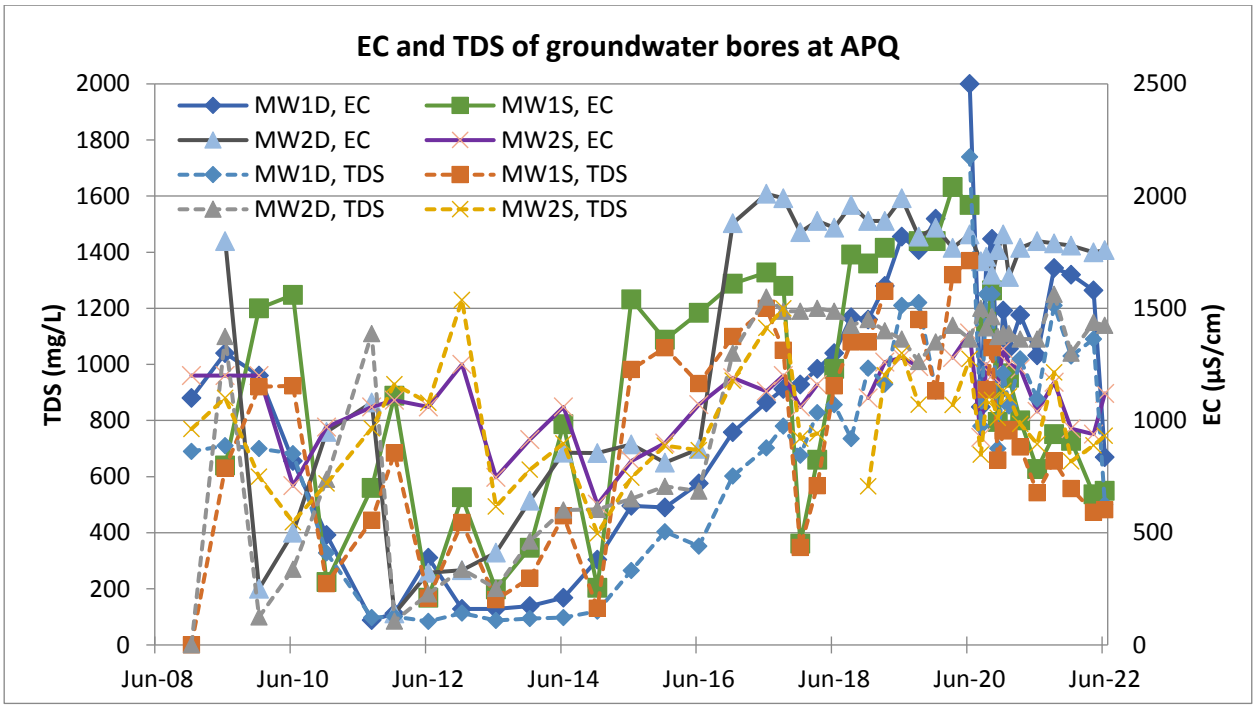


Groundwater levels in all monitoring bores have generally shown an increasing trend over the last 12 months, particularly in the MW1 series of bores. These bores were those most affected in the 2017-2019 drought, with the water levels now recovered to pre-drought levels. The general increase in groundwater level is likely attributable to the above average rainfall recorded during the reporting period. Other than the June 2022 sample for MW1D, there are no spikes in groundwater level observable across the monitoring network, suggesting a slow response to climatic effects, with the most recent spike in MW1D likely a delayed effect from the heavy rain earlier in the year. Quarrying has reached its maximum depth at the closest point to the MW1 bores, with no quarrying-related impacts to groundwater levels discernible in these bores.

Electrical Conductivity (µS/cm) and Total Dissolved Solids (mg/L)

EC µS/cm	2021/22 Reporting Period			Historical Results			Pre-quarrying maximum
	Min	Ave	Max	Min	Ave	Max	
MW1D	836	1437	1680	110	1060	2500	2700
MW1S	671	802	939	211	1186	2040	1236
MW2D	1750	1770	1790	140	1381	2010	2000
MW2S	940	1049	1170	627	1101	1390	1305
TDS mg/L	2021/22 Reporting Period			Historical Results			
	Min	Ave	Max	Min	Ave	Max	
MW1D	500	958	1210	84	670	1740	
MW1S	473	542	656	131	776	1370	
MW2D	1040	1145	1250	85	858	1240	
MW2S	654	771	972	397	797	1230	

The electrical conductivity (EC) and total dissolved solids (TDS) of groundwater bores have been highly varied throughout the historical period of monitoring. During the current monitoring period, the EC and TDS of all bores have shown an inverse relationship with groundwater level, with salinity/conductivity levels decreasing. This decrease in salinity is more evident in the shallow groundwater bores than the deeper bores, which is expected given the greater reliance on rainfall infiltration in the shallow groundwaters.

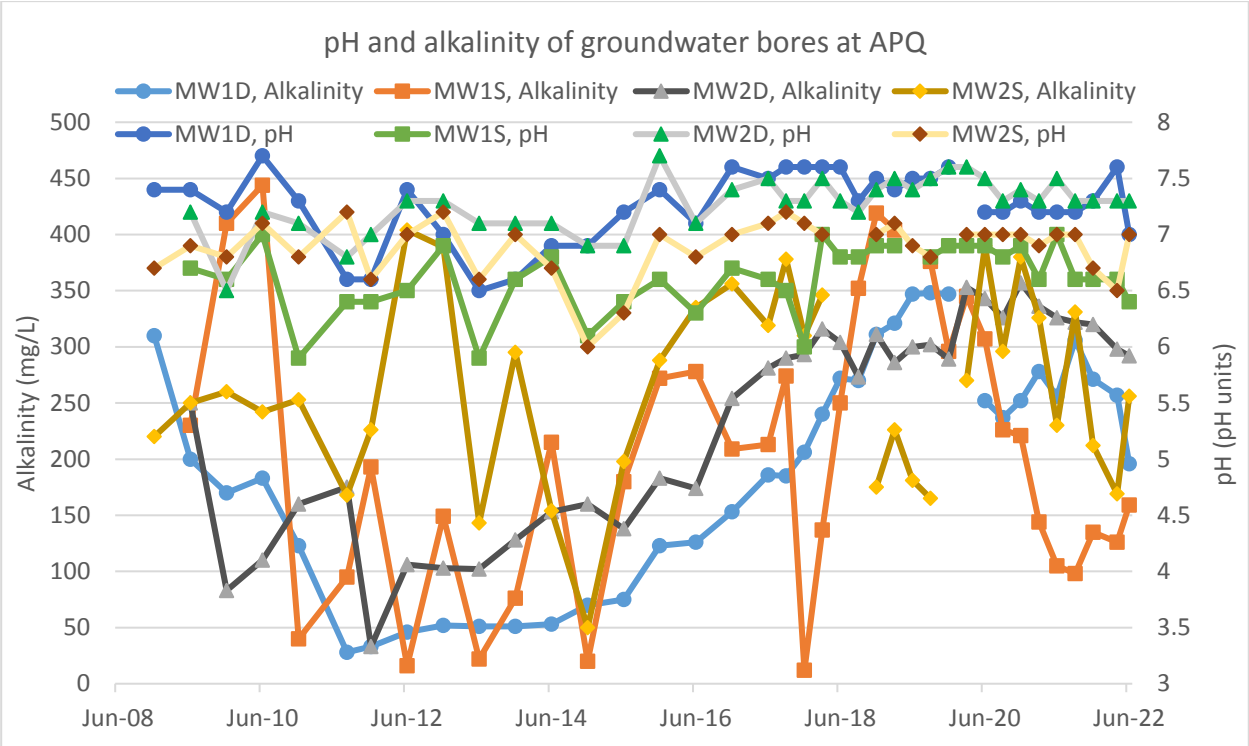


The electrical conductivity levels recorded in bore MW1D were at times above the level nominated in the Water Management Plan requiring additional monitoring for dissolved metals. The testing for the full metals suite confirmed that the higher electrical conductivity was not associated with any decrease in groundwater quality in relation to dissolved metals concentration.

pH and Alkalinity

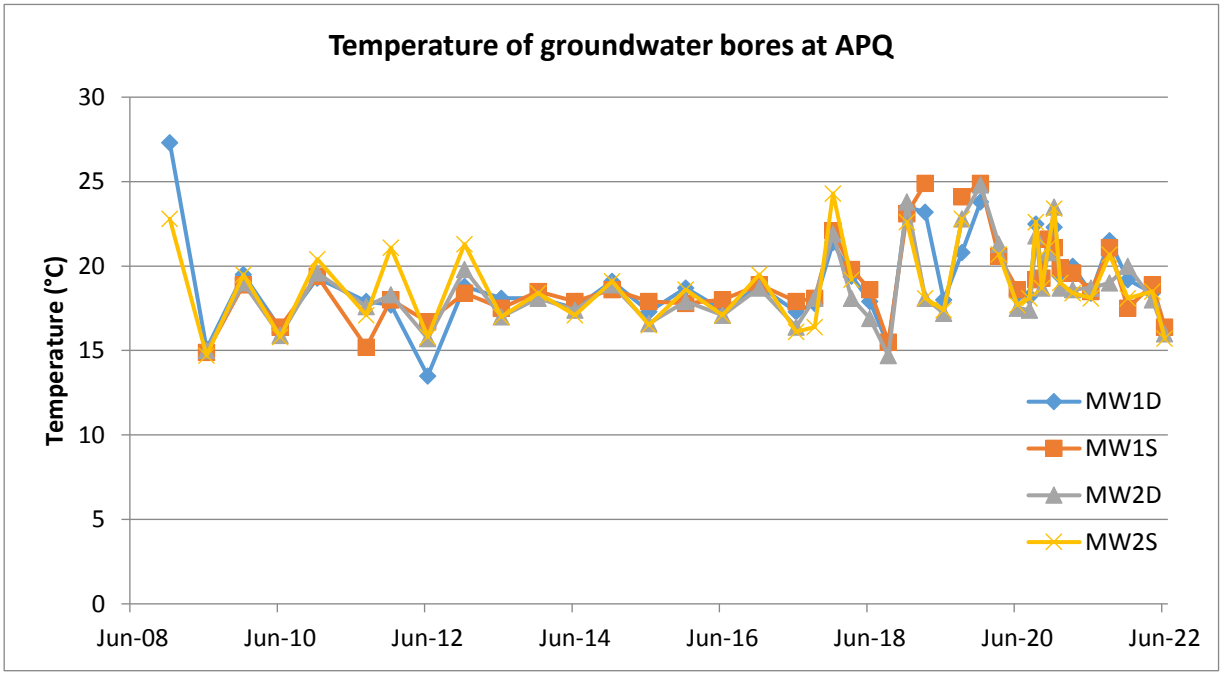
pH	2021/22 Reporting Period			Historical Results		
pH units	Min	Ave	Max	Min	Ave	Max
MW1D	7.0	7.3	7.6	6.5	7.2	7.7
MW1S	6.4	6.6	6.6	5.9	6.6	7.0
MW2D	7.3	7.3	7.3	6.5	7.3	7.7
MW2S	6.5	6.8	7.0	6.0	6.9	7.2
Alkalinity	2021/22 Reporting Period			Historical Results		
mg/L as $CaCO_3$	Min	Ave	Max	Min	Ave	Max
MW1D	196	258	306	28	187	348
MW1S	98	130	159	12	217	444
MW2D	292	308	322	33	230	357
MW2S	169	242	331	50	265	404

The pH measured in all groundwater bores has remained relatively stable in the current reporting period, with the shallow bores exhibiting a minor drop following the significant rainfall in 2022. Alkalinity has continued to show considerable variability, especially in the shallow bores, and has generally reduced during the reporting period due to the decreased salinity. All results were within the historical ranges for the respective bores for pH and alkalinity. These alkalinity concentrations indicate the buffering capacity of the groundwater has remained appropriate in recent times, ensuring the chemistry of the groundwater resource is well placed in the event of any adverse external influences.



Temperature (°C)

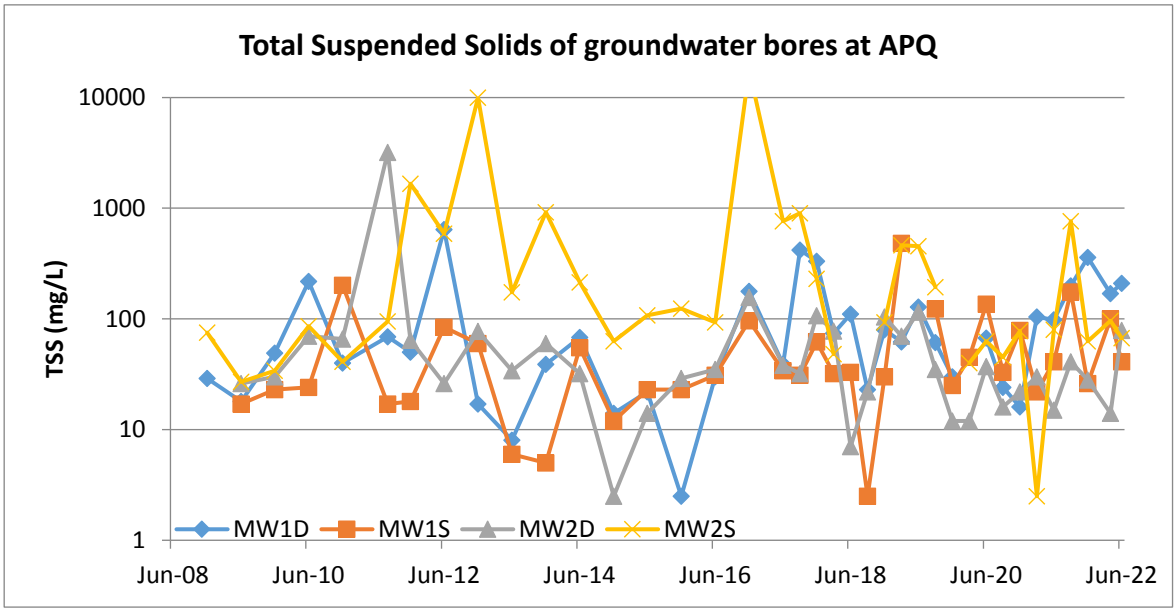
Temperature °C	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	16.3	18.9	21.5	13.5	19.2	27.3
MW1S	16.4	18.5	21.1	14.9	19.2	24.9
MW2D	16.0	18.3	20.0	14.7	18.7	24.8
MW2S	15.7	18.3	20.7	14.7	19.0	24.3



As expected, water temperature has fluctuated according to the season and remains consistent with the historical range.

Total Suspended Solids (mg/L)

TSS mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	170	235	359	<5	96	640
MW1S	26	86	175	<5	60	483
MW2D	14	41	79	<5	142	3200
MW2S	63	247	762	<5	1146	17800

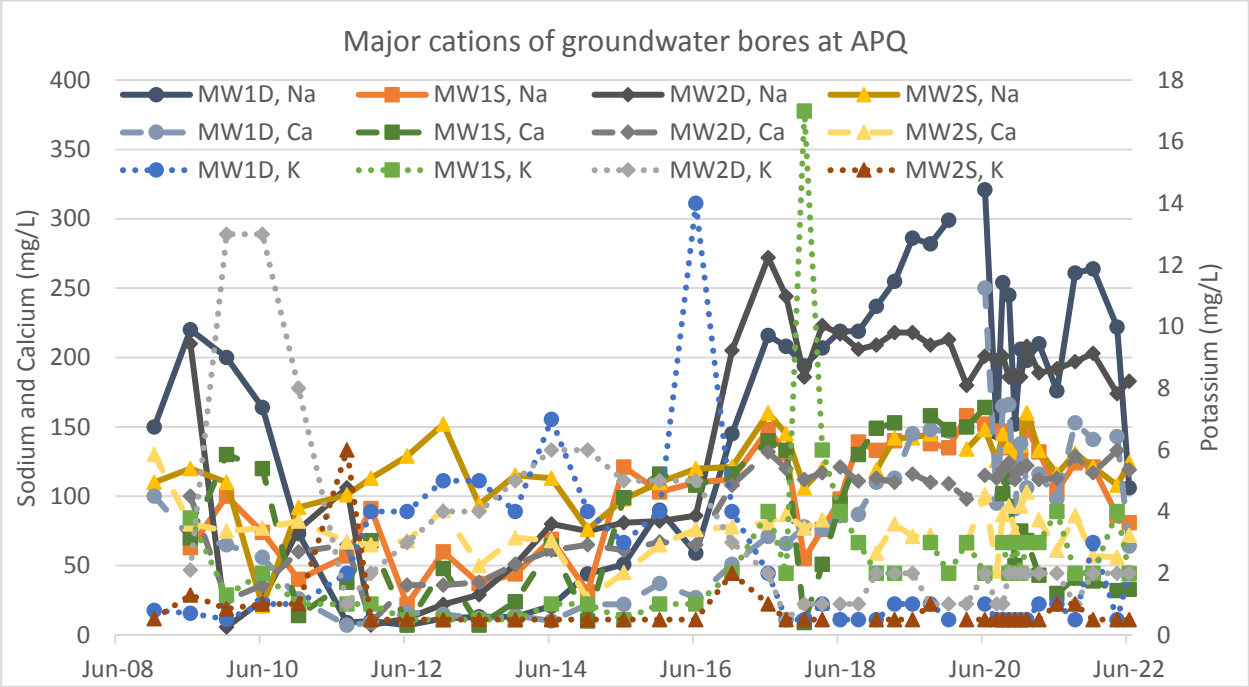


The total suspended solids (TSS) measured in all bores has remained within historical levels for the respective bores in the current reporting period. TSS has shown consistent variability in the current reporting period, consistent with the historical trend. Note a logarithmic scale has been used in the historical graph above to show variation across the full range of magnitudes.

Major Cations (Sodium, Potassium, Calcium – mg/L)

Sodium mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	106	213	264	7	157	321
MW1S	81	103	124	22	102	158
MW2D	174	189	203	5.7	149	272
MW2S	108	121	131	21	121	160
Potassium mg/L	**2021/22 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<1	2	3	<1	2	14
MW1S	2	3	4	<1	3	17
MW2D	1	2	2	<1	3	13
MW2S	<1	1	1	<1	<1	6

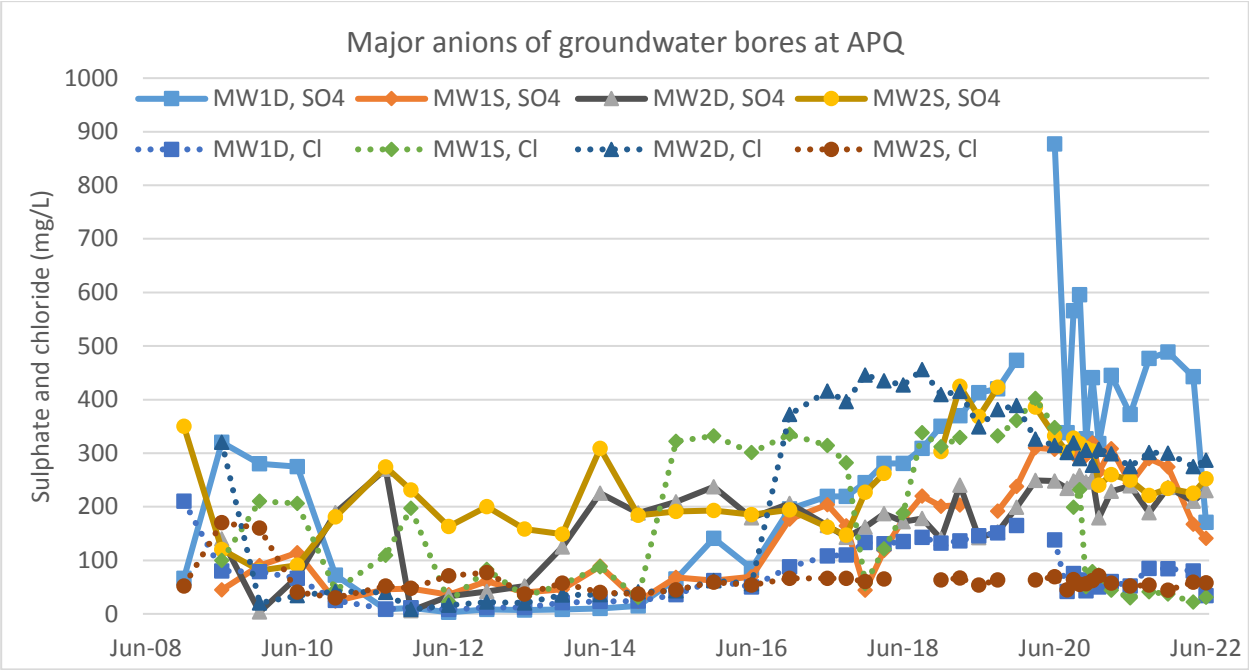
Calcium mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	64	125	153	7	79	250
MW1S	32	36	41	7	86	164
MW2D	117	125	133	9	89	132
MW2S	56	68	86	26	75	130



Concentrations of all major cations have for the most part decreased in the current reporting period consistent with the trends observed in TDS. All results have been consistent with the historical ranges of the respective bores, with some inherent variability in results typical of past trends.

Major Anions (Sulphate, Chloride – mg/L)

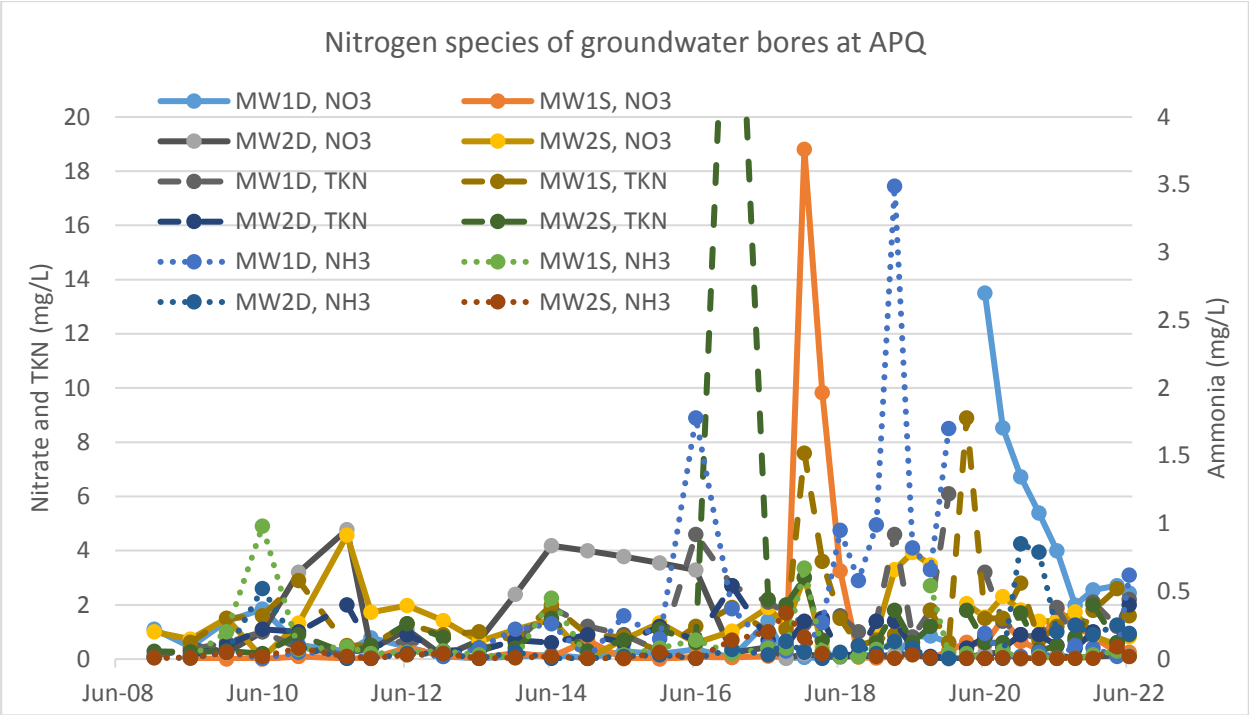
Sulphate mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	171	395	489	3	255	877
MW1S	141	218	290	23	156	319
MW2D	189	216	236	3.3	174	270
MW2S	221	233	252	81	246	425
Chloride mg/L	**2021/22 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	34	71	85	8	78	210
MW1S	22	33	41	22	187	402
MW2D	275	291	301	8	235	456
MW2S	44	54	59	30	63	170



Sulphate concentrations have largely mirrored recent changes in TDS, while chloride ion concentrations have generally remained stable and consistent with the historical record. All results have been within the historical ranges of the respective bores.

Nitrogen Species (Nitrate, Ammonia and Total Kjeldahl Nitrogen – mg/L)

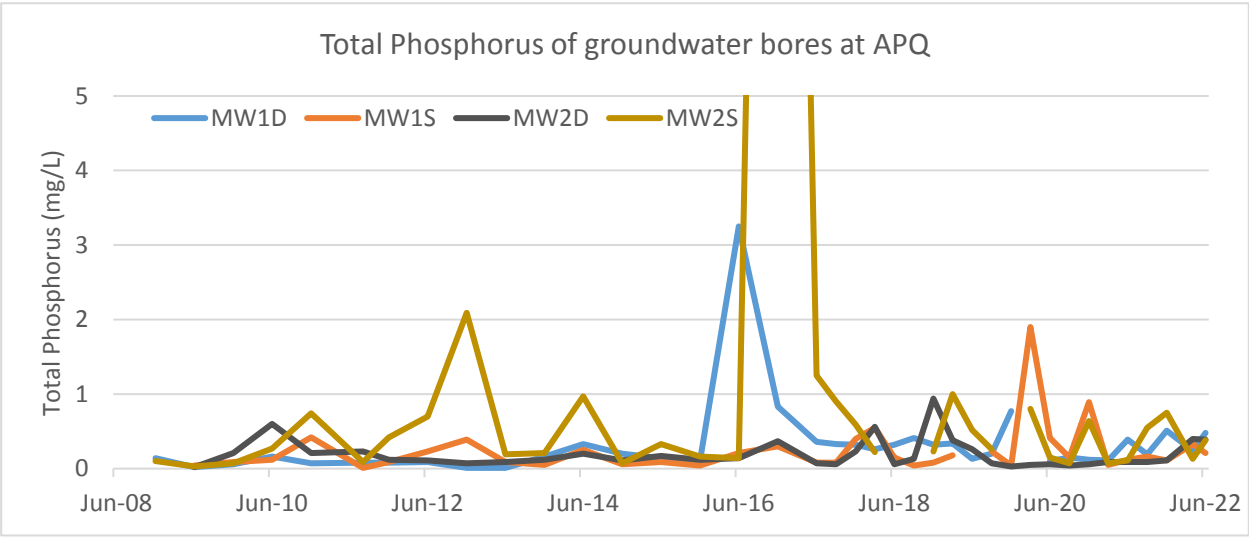
Nitrate as N mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	1.99	2.42	2.71	0.03	1.54	13.5
MW1S	0.25	0.64	1.25	<0.01	1.25	18.8
MW2D	0.04	0.10	0.13	<0.01	1.08	4.77
MW2S	0.52	0.98	1.74	0.04	1.61	4.57
Ammonia as N mg/L	**2021/22 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.02	0.21	0.62	<0.01	0.41	3.49
MW1S	<0.01	0.03	0.06	<0.01	0.13	0.98
MW2D	0.18	0.22	0.25	<0.01	0.10	0.85
MW2S	<0.01	0.03	0.09	<0.01	0.04	0.34
TKN as N mg/L	**2021/22 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.7	1.6	2.2	0.1	1.5	6.1
MW1S	0.7	1.7	2.6	0.3	1.7	8.9
MW2D	0.4	1.0	2	<0.1	0.8	2.7
MW2S	0.6	1.1	2	0.2	1.9	31.9



Measurements of all nitrogen species during the reporting year were stable and within the respective historical ranges for each bore. Concentrations of all nitrogen species showed less variability than in recent years, likely related to increased inflows to groundwater with the improved rainfall conditions.

Total Phosphorus (mg/L)

Phosphorus mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.19	0.36	0.51	0.01	0.31	3.25
MW1S	0.11	0.20	0.33	0.01	0.24	1.9
MW2D	0.09	0.25	0.4	0.02	0.18	0.94
MW2S	0.13	0.45	0.75	0.03	1.28	26.2



The concentration of total phosphorus in the groundwater has been measured at typical levels during the current reporting period, with some natural variability evident consistent with past years. All bores recorded total phosphorus concentrations within their respective historical ranges.

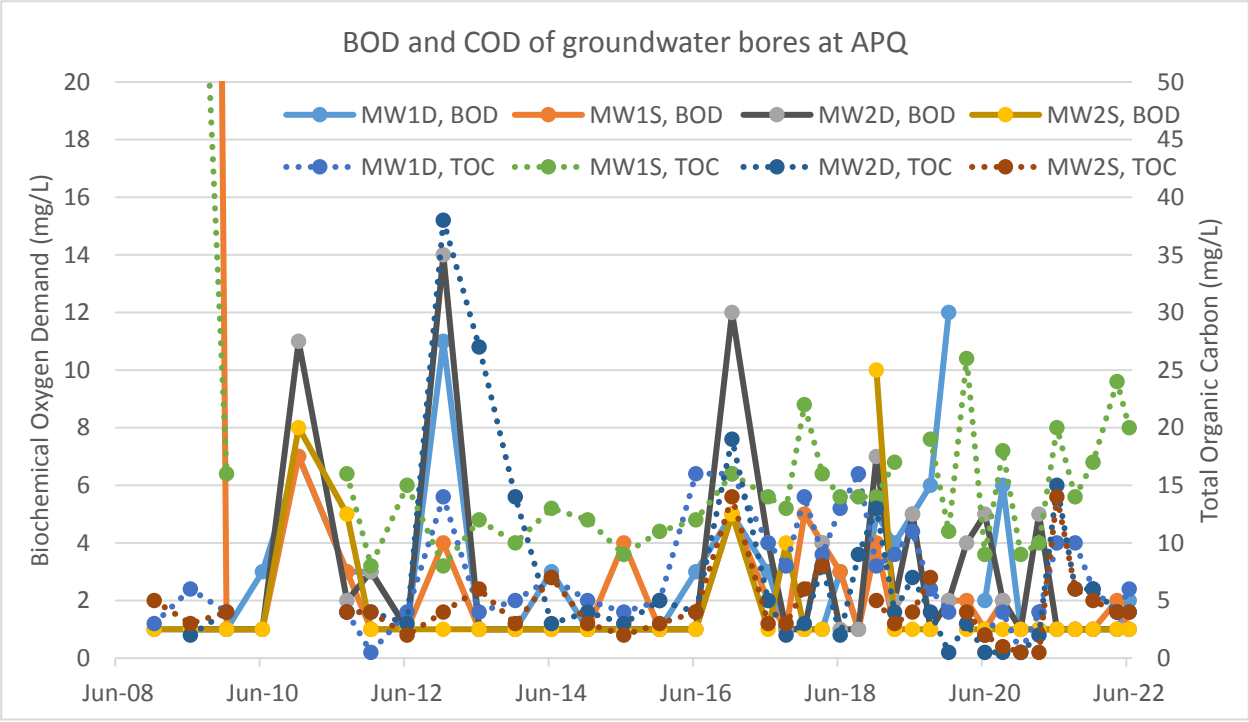
Oil and Grease (mg/L)

Oil and Grease mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	<5	<5	<5	<5	<5	8
MW1S	<5	<5	<5	<5	<5	13
MW2D	<5	<5	<5	<5	<5	6
MW2S	<5	<5	<5	<5	<5	8

Concentrations of oil and grease in the groundwater monitoring bores remained below the limit of reporting throughout the current reporting period. This is consistent with historical results.

Biochemical Oxygen Demand (mg/L) and Total Organic Carbon (mg/L)

BOD mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	<2	<2	2	<2	3	12
MW1S	<2	<2	2	<2	7	150
MW2D	<2	<2	1	<2	3	14
MW2S	<2	<2	1	<2	2	10
TOC mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	4	7	10	<1	7	16
MW1S	14	19	24	8	16	88
MW2D	4	5	6	<1	7	38
MW2S	4	5	6	<1	4	14

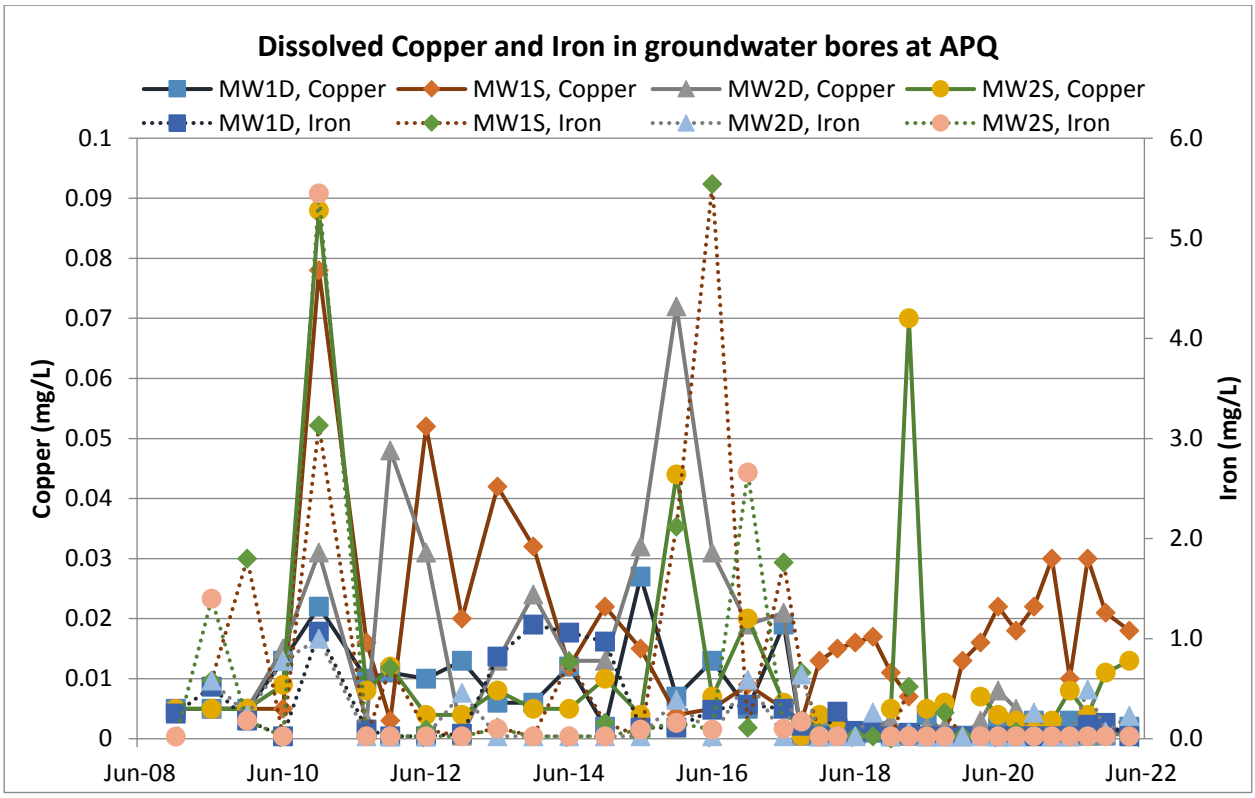


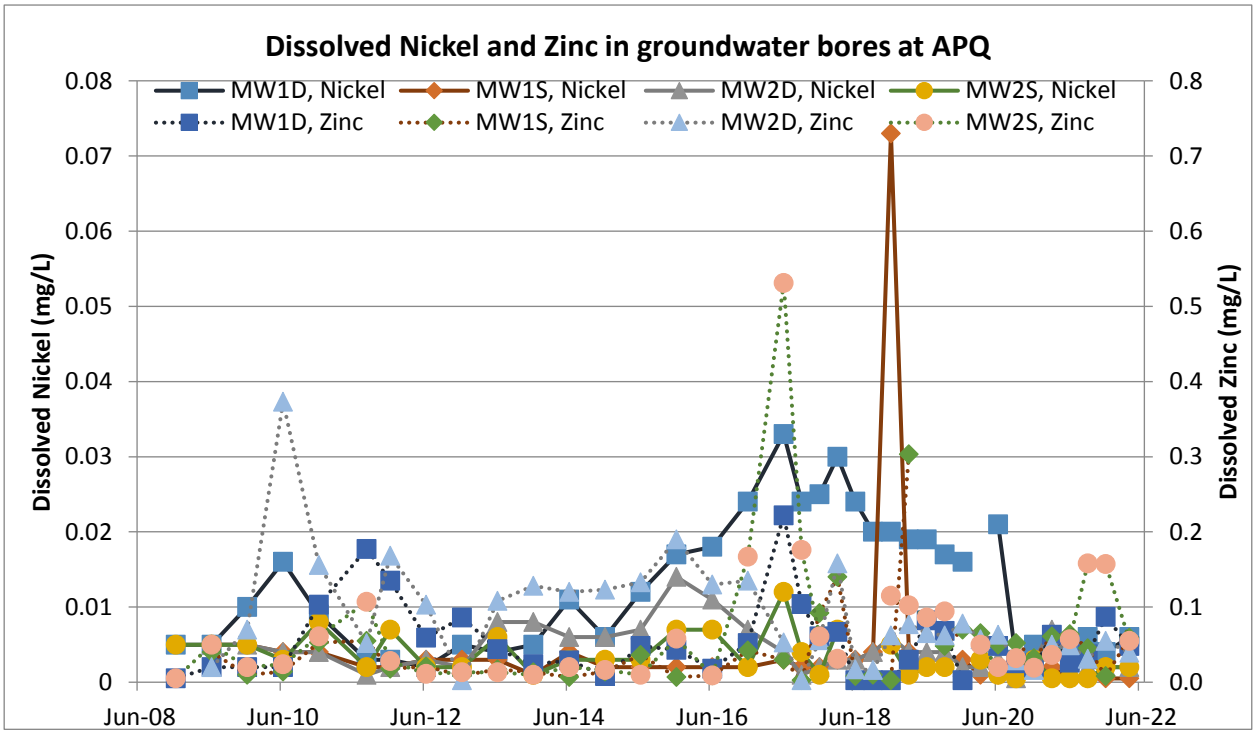
The results for Biochemical Oxygen Demand and Total Organic Carbon in the current reporting period are consistent with historical results.

Total Dissolved Metals (mg/L)

Concentrations of copper, iron, nickel and zinc are routinely measured in groundwater bores at the Albion Park Quarry, with this sampling program extended to arsenic, cadmium, chromium, lead and mercury where the electrical conductivity triggers are met as described in Section 3.2.1. For the current reporting period, the additional metals testing requirement was only triggered for MW1D.

Dissolved Copper mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.001	0.001	0.002	<0.001	0.006	0.027
MW1S	0.018	0.023	0.030	<0.001	0.017	0.078
MW2D	<0.001	<0.001	0.001	<0.001	0.012	0.072
MW2S	0.004	0.009	0.013	<0.001	0.012	0.088
Dissolved Iron mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.05	0.11	0.16	<0.05	0.25	1.14
MW1S	<0.05	<0.05	<0.05	<0.05	0.59	5.54
MW2D	<0.05	0.26	0.49	<0.05	0.18	1.00
MW2S	<0.05	<0.05	<0.05	<0.05	0.35	5.45
Dissolved Nickel mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.004	0.005	0.006	<0.01	0.013	0.033
MW1S	<0.001	<0.001	<0.001	<0.01	0.005	0.073
MW2D	0.002	0.002	0.002	<0.01	0.005	0.014
MW2S	<0.001	0.002	0.002	<0.01	0.004	0.012
Dissolved Zinc mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.037	0.057	0.087	<0.005	0.052	0.22
MW1S	0.008	0.037	0.059	<0.005	0.044	0.30
MW2D	0.031	0.042	0.055	<0.005	0.089	0.37
MW2S	0.055	0.123	0.158	<0.01	0.066	0.53
MW1D additional metals mg/L	2021/22 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
Dissolved Arsenic	<0.001	<0.001	<0.001	<0.001	0.002	0.005
Dissolved Cadmium	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0050
Dissolved Chromium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Lead	<0.001	<0.001	<0.001	<0.001	0.004	0.047
Dissolved Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.01





Concentrations of all dissolved metals remained low during the reporting period and within historical ranges of the respective analytes. Dissolved copper, iron, nickel and zinc concentrations showed similar patterns of natural variability to the historical results for these analytes, indicating no deterioration in groundwater quality related to concentrations of dissolved metals.

As described above, bore MW1D was sampled for the extended metals suite on three of the sampling events. In each case, the extended metals tested below the limit of reporting for the respective analyte, evidence that the elevated electrical conductivity is not related to increases in these trace metals. The stable concentrations of all dissolved metals tested in all monitoring bores show that there was no decline in groundwater quality in relation to trace metals.

3.2.4 Groundwater Monitoring Results Interpretation

The groundwater monitoring program has provided an insight into the hydrogeological regime around the Albion Park Quarry, with the extended period of monitoring useful for highlighting any changes to groundwater quality and quantity that are outside of natural factors.

The current reporting period has been characterised by the continued recovery in groundwater levels and reductions in major ion concentrations coming off the 2017-2020 drought. The above average rainfall recorded throughout the reporting period is likely to be driving these changes. It is worth noting that these changes appear somewhat delayed from the episodic rainfall events, with a slow response evident from the groundwater monitoring records. Despite the increased infiltration associated with above average rainfall, concentrations of trace metals have been relatively unchanged in the current reporting period, with no deterioration in quality evident as a product of dissolved metal concentrations. It is expected that climatic impacts will continue to be the primary driver of groundwater quantity and quality in the vicinity of the site.

There are no specific objectives or targets for groundwater described in either the DC or EPL, and as such there is no opportunity to assess compliance against these legislative instruments. The Environmental Impact Statement for the project predicts groundwater availability in the shallow surface aquifer to decline as a result of quarrying operations, with the related impact of reduced surface water flows in the local watercourses. However groundwater levels in the shallow aquifer have increased in the current reporting period, and are consistent with pre-drought and pre-quarrying levels, suggesting little impact to groundwater levels in the shallow aquifer as a result of quarrying.

All activities related to groundwater management in the current reporting period have been undertaken as per the requirements of the DC and Water Management Plan for the project, and as such no non-compliances have been observed relating to groundwater management over this period.

The monitoring program has historically involved biannual sampling of each bore, which was increased in 2017 to quarterly monitoring. This has allowed greater resolution regarding variations in groundwater quantity and quality, and is sufficient to meet the needs of the groundwater monitoring program at the present time.

3.3 Surface Water Monitoring

3.3.1 Standards and Performance Measures

The EPL for the Albion Park Quarry requires the monitoring of Sewage Treatment Plant effluent quality, as well as discharge and receiving water quality as detailed below.

The DC requires the implementation of a Water Management Plan (incorporating a Surface Water Monitoring Program), which outlines the monitoring requirements related to surface water management, which was most recently revised during 2021. The DC also requires the water quality monitoring of any discharges from the quarry extension area, mirroring the conditions of the EPL.

The following monitoring schedules are in place to meet the requirements of the EPL and surface water monitoring program.

Location	Analyte	Units	EPL Limit	Frequency
Sewage Treatment Plant*	Biochemical Oxygen Demand	mg/L	150	Quarterly
	Oil and Grease	mg/L	30	
	Total Suspended Solids	mg/L	50	
Quarry Extension Discharge	pH	pH units	6.5 – 8.5#	Daily during discharge
	Turbidity	NTU	32.2#	

Location	Analyte	Units	EPL Limit	Frequency
Main Holding Dam	pH Total Suspended Solids	pH units mg/L	6.5 – 8.5 50	Daily during overflow
Watercourse West of Quarry Manager's Office	pH Total Suspended Solids	pH units mg/L		Daily during overflow of main sedimentation pond
Watercourse 1 and Watercourse 2	Discharge	L/s		Monthly
	Electrical Conductivity pH Temperature Turbidity	µS/cm pH units °C NTU		Quarterly
	Oil and Grease	mg/L		
	TSS & TDS	mg/L		
	Major Cations (Na, K, Ca)	mg/L		
	Major Anions (SO_4, Cl)	mg/L		
	Alkalinity	mg/L		
	Dissolved Metals (Cu, Fe)	mg/L		

Furthermore, where the electrical conductivity of Watercourse 1 exceeds 1,000 µS/cm or Watercourse 2 exceeds 1,700 µS/cm, the sampling suite will be extended to include additional dissolved metals for analysis (As, Cd, Cr, Ni, Pb, Hg, Zn). For the current reporting period, the additional metals testing requirement was not triggered for the watercourses. Where EPL water quality limits apply, these are included in the table above, with the symbol # depicting limits that are also contained in the development consent. Furthermore, the aim of the surface water quality monitoring programme is to ensure no exceedance of licence conditions and to assess the potential relationships between surface water and groundwater.

The sewage treatment plant was decommissioned in the first half of the reporting period, as the site was connected to the sewerage network. The EPL was subsequently varied on 8 December 2021 to remove the requirement to monitor effluent from the plant, as it was no longer in operation.

The EIS for the Albion Park Quarry predicted that the operations would have negligible impact on surface water quality, however releases of water captured in the quarry sump may be required to sustain natural surface water flow volumes of the local watercourses.

3.3.2 Environmental Performance

CB has implemented the Surface Water Monitoring Program at the Albion Park Quarry, with all routine sampling undertaken as required by the table above. During the reporting period, water was discharged from the sump in the Quarry Extension on 10 occasions across 21 days, with daily sampling of water quality undertaken as specified by the table above. It is estimated that approximately 191ML of water was discharged from the quarry pit across the reporting period. All discharges occurred during or shortly after rainfall events. There were also two occasions (across six days) throughout the reporting period where rainfall runoff caused an overflow of the spillway of the main dam.

3.3.3 Surface Water Monitoring Results

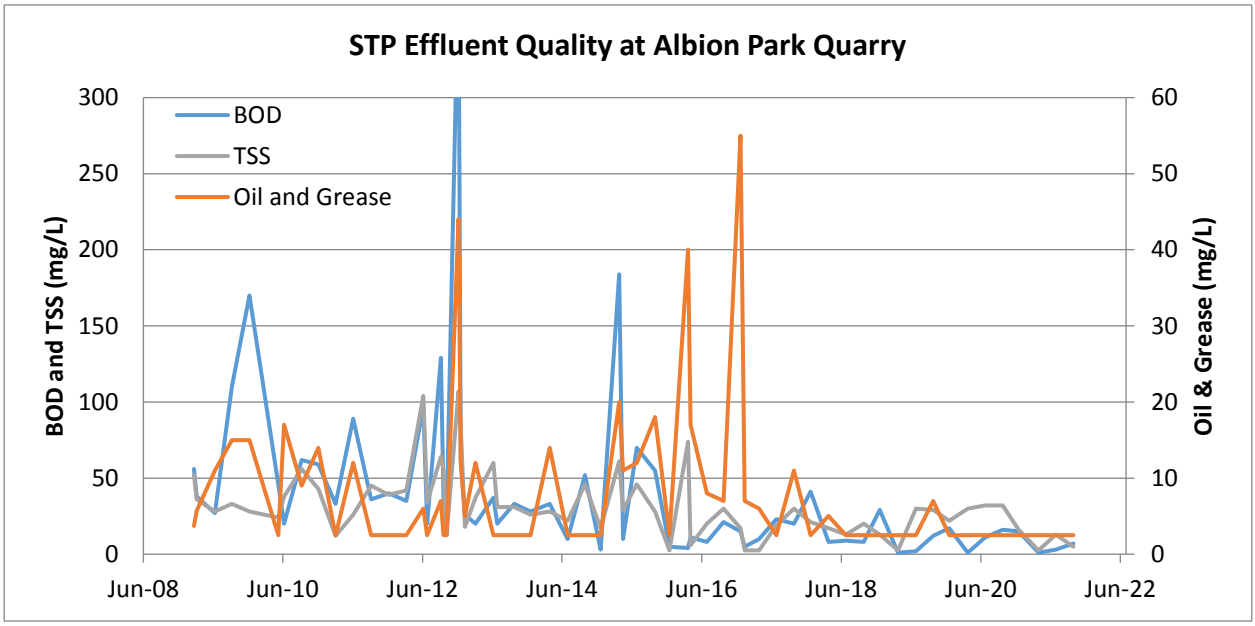
A summary of surface water monitoring results for the period is displayed in this section, separated into the various components as described in the table above. For each analyte, the range and average of the current period's monitoring are displayed, alongside the historical range and average. For each analyte and where practicable, a historical graph is also included showing the variations in measurements for each sample

point throughout the historical monitoring period. As no criteria are specified for most surface water flow or quality in the EIS or Development Consent, no comparison is available in relation to surface water monitoring.

Sewage Treatment Plant Monitoring

Monitoring of sewage treatment plant effluent was discontinued during the reporting period once the site was connected to the town sewer network. One quarterly sample was collected.

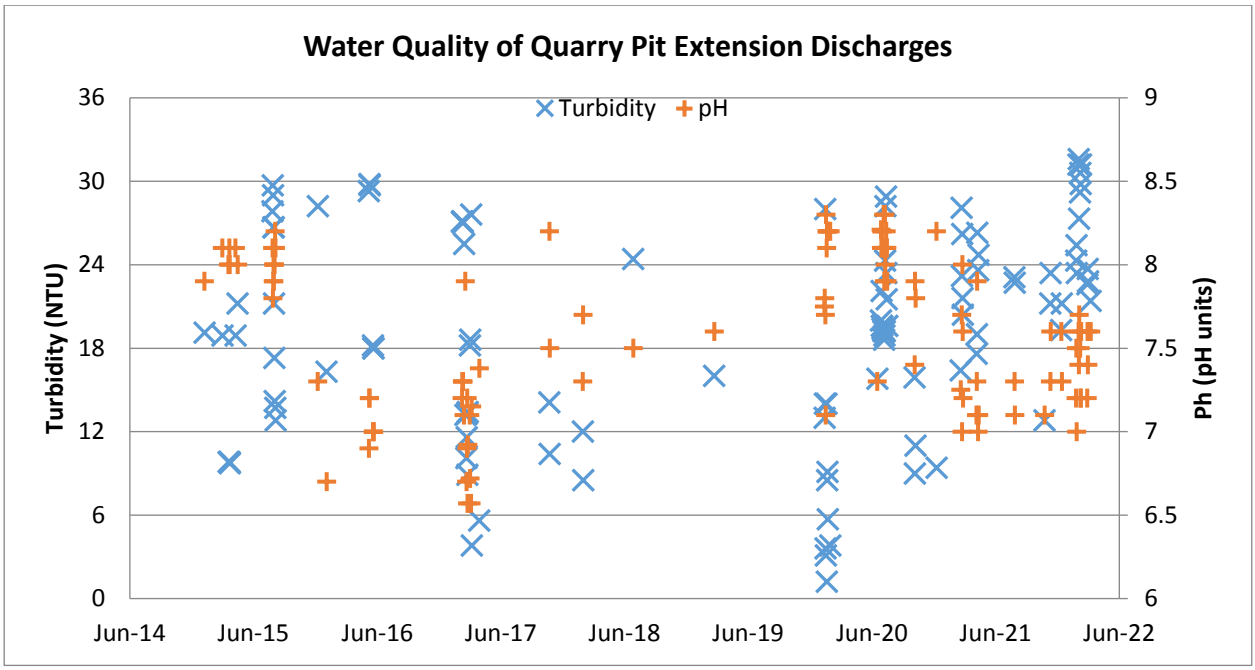
Analyte	Unit	2021/22 Reporting Period	Historical Results			DC limit	EPL trigger
		September 2021	Min	Ave	Max		
Oil and Grease	mg/L	<5	<5	8	55	N/A	30
TSS	mg/L	5	<5	32	107	N/A	50
BOD	mg/L	7	<2	41	387	N/A	150



All analytes measured at the Sewage Treatment Plant were within EPL triggers in the current reporting period, and within the historical range of measurements for the respective analytes. All measurements of the STP effluent show improvements in consistency when compared to the historical performance, with average concentrations of all analytes below their historical averages. There were no predictions relevant to STP effluent in the EIS for the project. STP effluent monitoring has now been discontinued and will not be reported in future Annual Reviews.

Quarry Extension Discharge Monitoring

Analyte	Unit	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
		Min	Ave	Max	Min	Ave	Max		
pH	pH units	7.0	7.4	7.7	6.6	7.7	8.3	6.5 – 8.5	6.5 – 8.5
Turbidity	NTU	12.8	24.7	31.6	1.2	18.1	29.8	32.2	32.2



All discharges from the Quarry Extension complied with the limits of the EPL and DC for turbidity and pH during the current reporting period.

The EIS recommended the surface release of captured water to be undertaken in short bursts associated with rainfall events, rather than uniform minor releases, and this has been achieved in the current reporting period through the release of water associated with rainfall events throughout the year. The main discharge events coincided with significant rainfall across February and March 2022, with minor releases following rainfall at other times of the year. The EIS predicted the project would not have a significant impact on water quality, as EPL limits are in place to govern the water quality of any discharges. As previously stated, all EPL limits were complied with in the current reporting period for discharges from the Quarry Extension. The data and interpretation represents monitoring associated with discharges from the Quarry Pit Extension only.

Main Holding Dam Monitoring

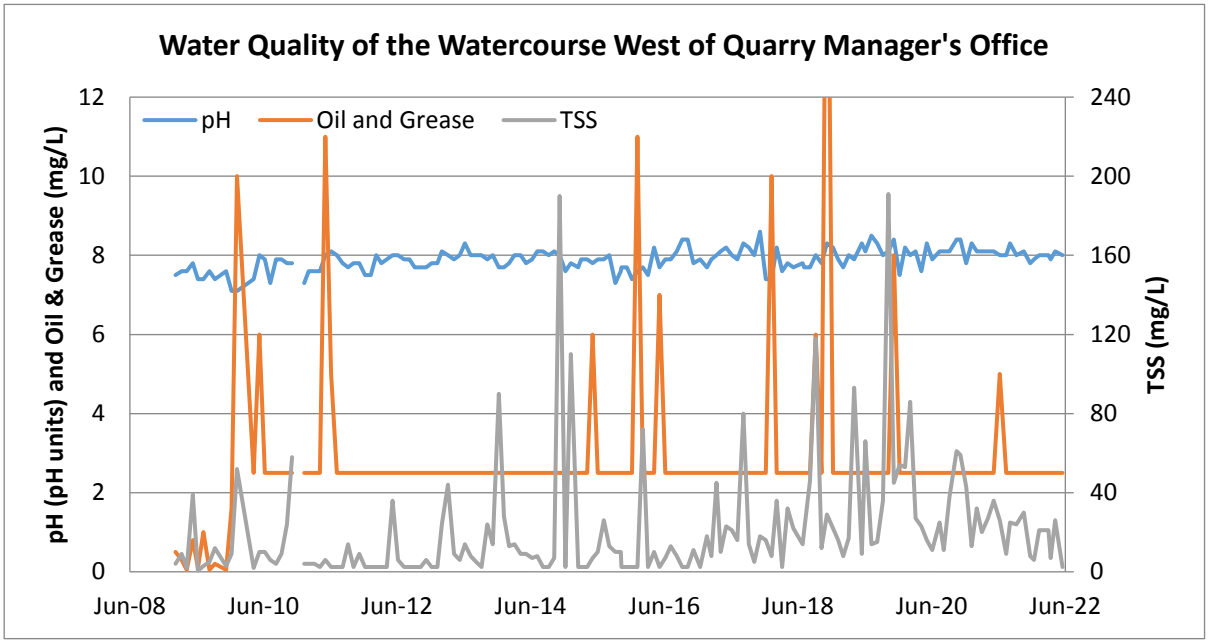
Rainfall runoff exceeded the capacity of the Main Holding Dam and overflowed on two occasions across six days during the reporting period. This dam is outside of the area covered by the Development Consent, however the EPL requires daily monitoring during any discharge from the dam. On one occasion across two days the EPL limit was exceeded for total suspended solids (TSS). At the time of this exceedance, flooding was experienced across many coastal areas of NSW, and a Disaster Declaration was in place for the Shellharbour City Local Government Area (amongst many other LGA's). The EPA issued a direction that licence exceedances in affected LGA's as a direct result of the flooding, as was the case in this instance, did not need to be reported. Nevertheless, Cleary Bros investigated the exceedance and determined that significant rainfall (>450mm) fell in the days immediately preceding and during the dam overflows, with accumulated runoff far exceeding the capacity of the dam. pH levels were in line with the requirements of the EPL on each occasion.

Watercourse West of Quarry Manager's Office Monitoring

On each day where water overflowed from the Main Holding Dam, the pH and total suspended solids were measured in the watercourse west of the former Quarry Manager's Office in accordance with the requirements of the EPL. This monitoring point is not related to the Development Consent for the Quarry Extension, and there are no licence limits associated with this monitoring point. The pH of the water measured during these natural overflows ranged between 7.7 and 8.3 pH units, while the TSS ranged between 29 and 695 mg/L.

In addition to the overflow monitoring, monthly monitoring of water quality of the natural flows in this watercourse were undertaken for pH, Oil and Grease, and TSS. The results of this routine monitoring are summarised below.

Analyte	Unit	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
		Min	Ave	Max	Min	Ave	Max		
pH	pH units	7.8	8.0	8.3	7.1	7.9	8.6	N/A	N/A
Oil & Grease	mg/L	<5	<5	5	<0.1	<5	20	N/A	N/A
TSS	mg/L	3	17	30	<1	21	191	N/A	N/A



Water quality of the watercourse was largely stable during the current reporting period with the exception of the dam overflows associated with rainfall well above the design capacity of the Main Holding Dam, with all routine monthly results in line with the historical range.

Watercourse 1 and Watercourse 2 Monitoring

Monitoring of the water quality of natural watercourses adjacent to the Quarry Extension were undertaken on a quarterly basis, while sampling of flow rates was undertaken monthly. The results of this monitoring have been separated into logical analyte groupings below. No DC or EPL limits are applicable in this instance, and as such there is no further discussion on their relationship to these regulatory instruments.

Flow Monitoring

Flow data is collected on a monthly basis from each of the watercourses. This data is sampled using one of two methods, depending on flow. The first method uses a flow meter measuring flow velocity across various sections of each stream, and when combined with measurements to calculate the cross-sectional area of each section, a total stream discharge in litre per second is able to be calculated. For lower flows, the flow is captured in a calibrated bucket, with the time taken to fill the bucket used to calculate stream discharge. Sampling is designed for safety and practicality reasons to be undertaken during periods of base flow outside of storm periods. Given the ephemeral nature of the streams, there are periods where no flow is measurable, with flow in Watercourse 2 often solely dependent on discharges from the adjacent quarry in the upper catchment of this stream, while Watercourse 1 has negligible catchment. A summary of measured flows in the watercourses is included in the table below.

	Flow (L/sec)	
Month	WC1	WC2
Jul-21	no flow	no flow
Aug-21	no flow	no flow
Sep-21	no flow	no flow
Oct-21	no flow	no flow
Nov-21	0.013	105
Dec-21	no flow	12
Jan-22	no flow	27
Feb-22	0.060	34
Mar-22	Could not access site due to conditions	Could not access site due to conditions
Apr-22	0.029	107
May-22	0.022	96
Jul-21	no flow	no flow

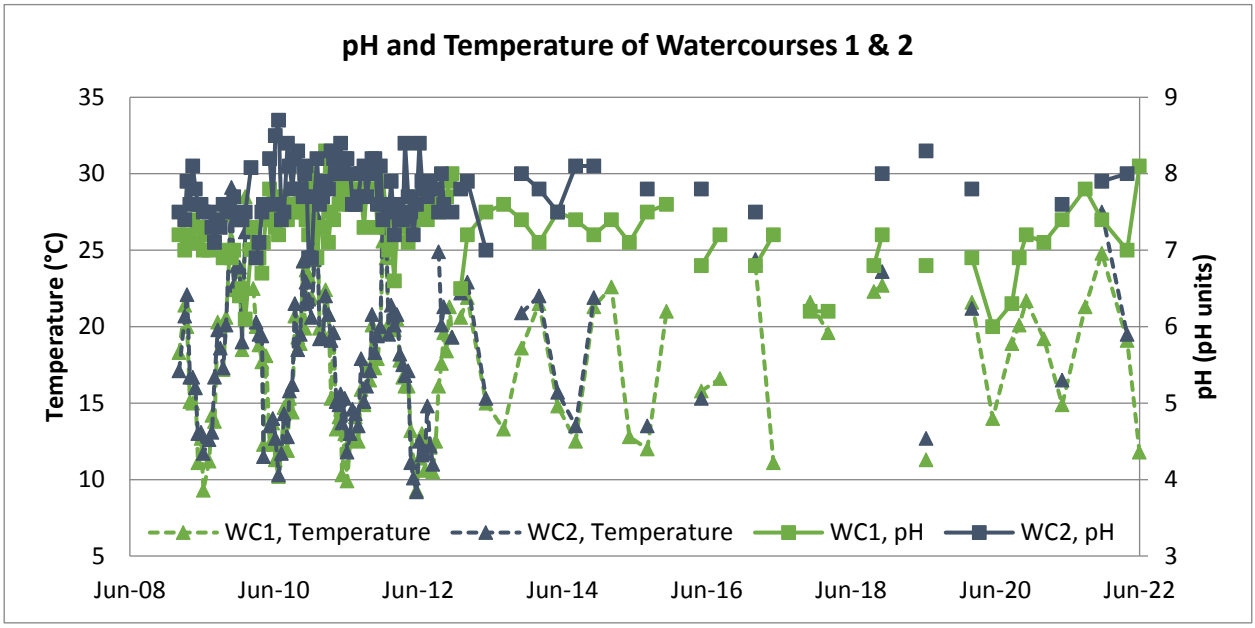
Flows monitoring indicates that flows in both watercourses have increased in the current reporting period compared with the previous period, which is reflective of the significantly above average rainfall observed in the current year. As the flow monitoring programme is targeted to measure baseflows, the peak flow events associated with rainfall are not recorded, as monitoring is restricted to dry periods. Furthermore, the sampling point for Watercourse 1 is located immediately adjacent to the quarry pit, with its former tributaries absorbed into the quarry pit. This is reflective in the nil or very low baseflow recorded at this sampling point throughout the reporting period, as had been forecast in previous Annual Reviews.

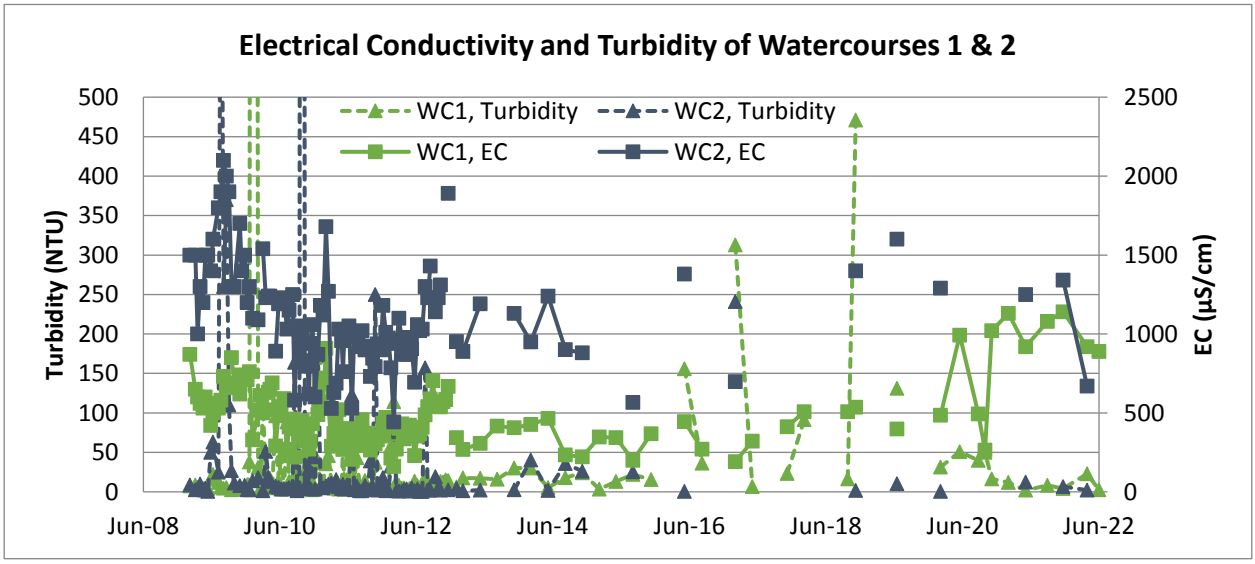
The EIS predicted that surface water flows in the watercourses may be affected by quarrying operations, with groundwater injection of captured water required if the rainforest vegetation associated with these watercourses showed signs of stress. Now that the catchment of Watercourse 1 has been consumed by quarrying activities, the flows in this watercourse are now largely dependent on discharges from the quarry pit. While the intermittent nature of these watercourses hinders the ability to make accurate interpretations regarding changes in flow, especially considering the rainfall dependent nature of these streams, biannual assessments of these ecosystems to date have shown no observable decline in health, with water stress not identified in the rainforest assemblages. As such, the Albion Park Quarry has continued to manage water availability to the adjacent watercourses in line with EIS predictions and DC requirements.

Field measurements (EC, pH, Temperature, Turbidity)

pH	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
pH units	Min	Ave	Max	Min	Ave	Max		
WC1	7.0	7.6	8.1	6.0	7.3	8.3	N/A	N/A
WC2	7.9	8.0	8.0	6.9	7.8	8.7	N/A	N/A
Temperature	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
°C	Min	Ave	Max	Min	Ave	Max		
WC1	11.8	19.3	24.8	9.3	17.3	29.3	N/A	N/A
WC2	19.5	23.5	27.5	9.2	17.8	29.1	N/A	N/A

EC	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
µS/cm	Min	Ave	Max	Min	Ave	Max		
WC1	888	1007	1140	160	472	1130	N/A	N/A
WC2	670	1005	1340	443	1115	2100	N/A	N/A
Turbidity	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
NTU	Min	Ave	Max	Min	Ave	Max		
WC1	2.7	9.5	22.8	2.0	75	5890	N/A	N/A
WC2	2.3	4.6	6.8	0.5	81	5040	N/A	N/A





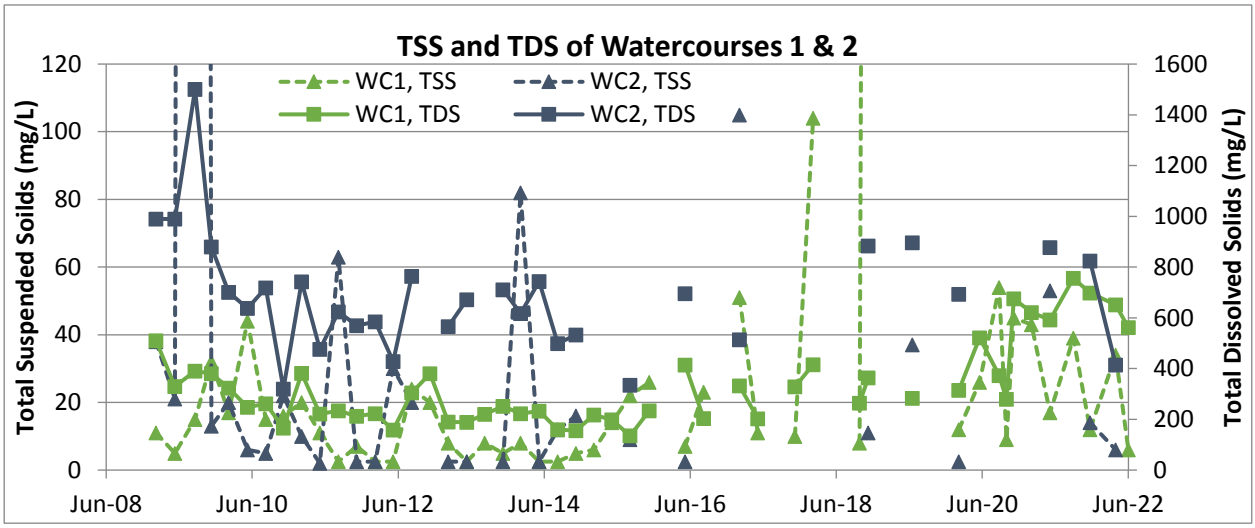
pH has continued to show some variability in the current reporting period, which is consistent with the longer term trend. Temperature continues to show fluctuations in line with the seasons. Electrical conductivity has decreased during the current reporting period, likely a result of higher baseflows and a reduction in the electrical conductivity of the shallow groundwater. The monitoring point on WC1 was moved slightly downstream in 2020 to a small old on-stream farm dam, providing more reliable sampling opportunities, but the dam is subject to evaporative concentration outside of rainfall events. Turbidity measurements have remained low and relatively stable. All field measurements were generally consistent with the historical measurements for the respective watercourses.

Oil and Grease

Oil and Grease was measured below the limit of reporting of 5 mg/L for all samples during the current reporting period. These results are consistent with the historical monitoring for these sites, where the concentration of Oil and Grease has consistently remained below the limit of reporting. This is in line with EIS predictions that quarry operations would have no discernible impact on water quality.

Total Suspended Solids (TSS) and Total Dissolved Solids (TDS)

TDS	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	562	667	756	135	303	676	N/A	N/A
WC2	414	619	824	320	695	1500	N/A	N/A
TSS	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	6	23	39	3	37	699	N/A	N/A
WC2	6	10	14	2	110	2600	N/A	N/A

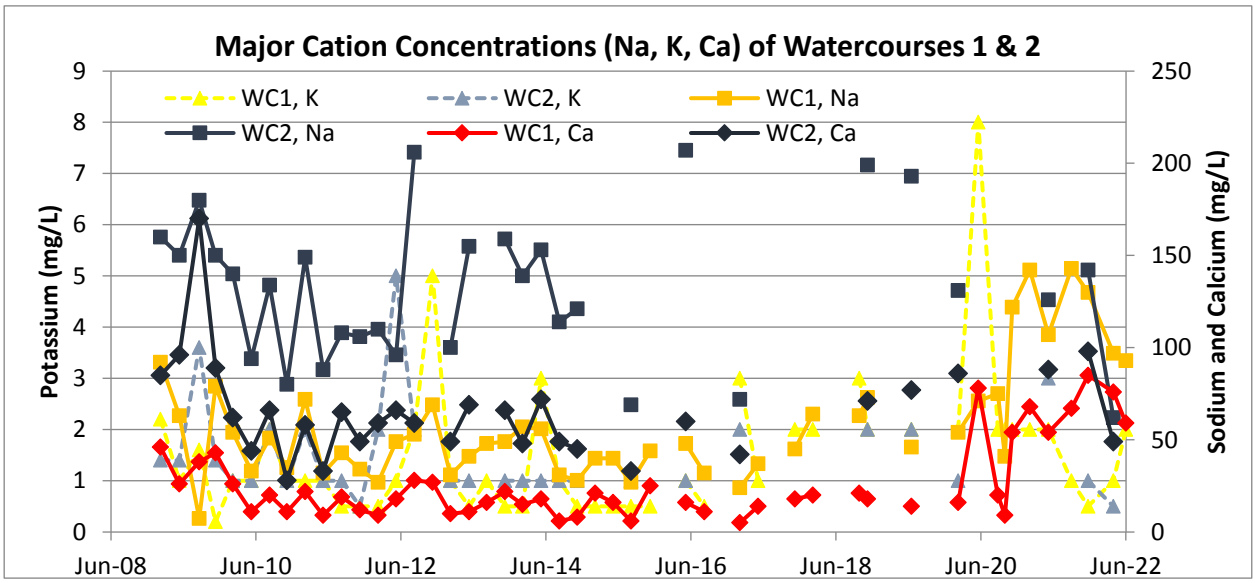


Concentrations of Total Dissolved Solids and Total Suspended Solids were consistent with the measurements for electrical conductivity and turbidity respectively during the reporting period. All measurements were also within the historical ranges for the respective analytes with the exception of TDS for Watercourse 1, which was related to the location of the sampling point as described above under electrical conductivity, and which has shown a decreasing trend throughout the reporting period due to improved baseflows.

Major Cations (Sodium, Potassium, Calcium)

Sodium	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	93	116	143	7	53	142	N/A	N/A
WC2	62	102	142	69	134	207	N/A	N/A
Potassium	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	<1	1	2	<1	2	8	N/A	N/A
WC2	<1	1	1	<1	2	5	N/A	N/A

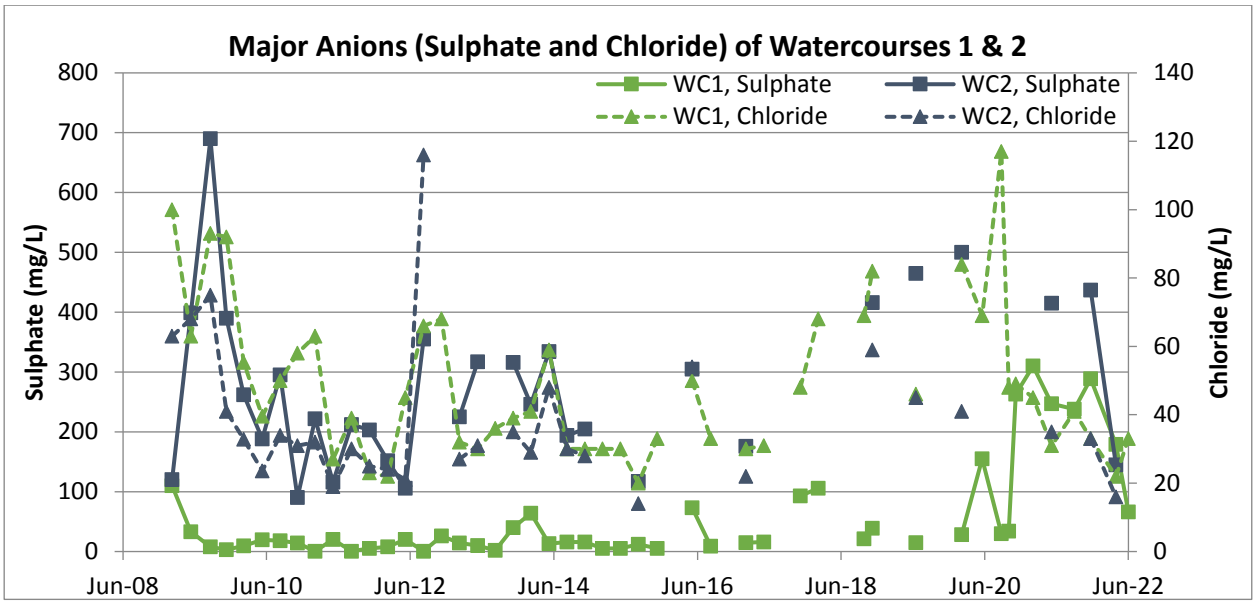
Calcium	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	59	72	85	5	22	78	N/A	N/A
WC2	49	74	98	28	65	170	N/A	N/A



Concentrations of all major cations have remained within the respective historical ranges for Watercourse 1 and Watercourse 2 during the current reporting period, with the exception of the calcium and sodium concentrations which have mirrored the changes in salinity recorded. The concentrations of these ions have decreased through the reporting period due to the increase in baseflows. The current monitoring suggests there has been no deterioration in surface water quality related to cation concentrations.

Major Anions (Chloride, Sulphate)

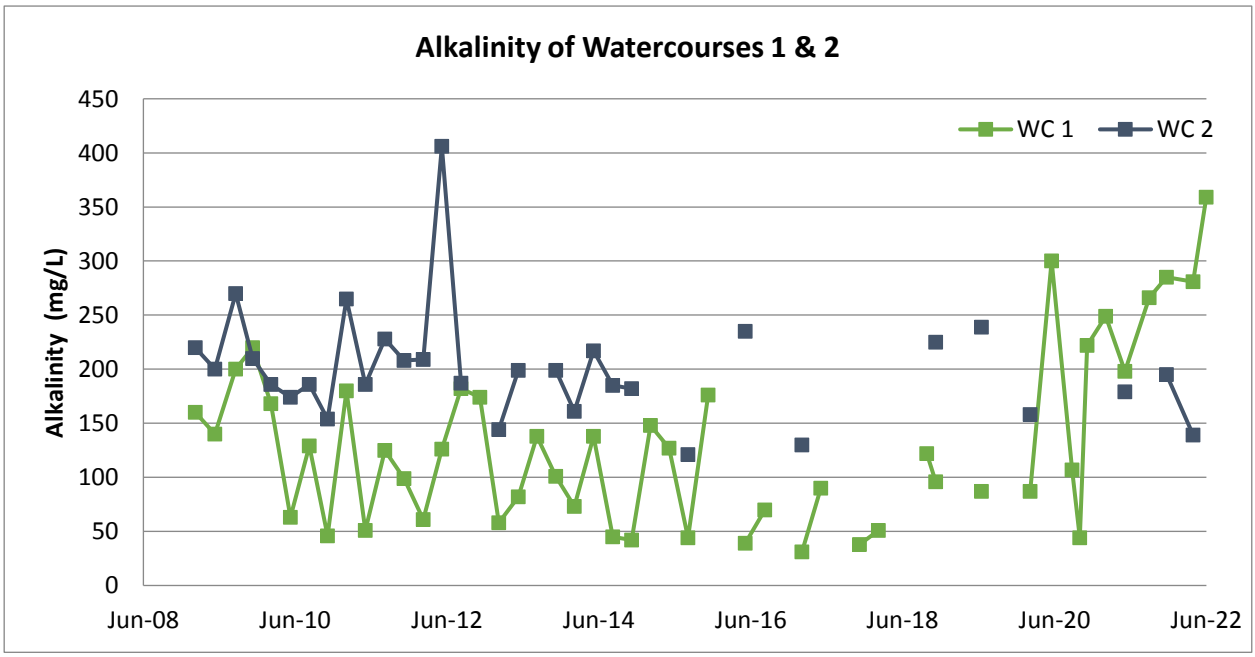
Sulphate	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	66	193	289	<1	44	310	N/A	N/A
WC2	145	291	437	90	277	690	N/A	N/A
Chloride	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	22	32	41	20	50	117	N/A	N/A
WC2	16	25	33	14	39	116	N/A	N/A



Concentrations of sulphate and chloride have remained within the historical ranges for the watercourses during the current reporting period. All analytes have continued to exhibit natural levels of variability including a decrease throughout the reporting period, and commensurate with total concentration of dissolved solids. The current monitoring suggests there has been no deterioration in surface water quality related to anion concentrations.

Alkalinity

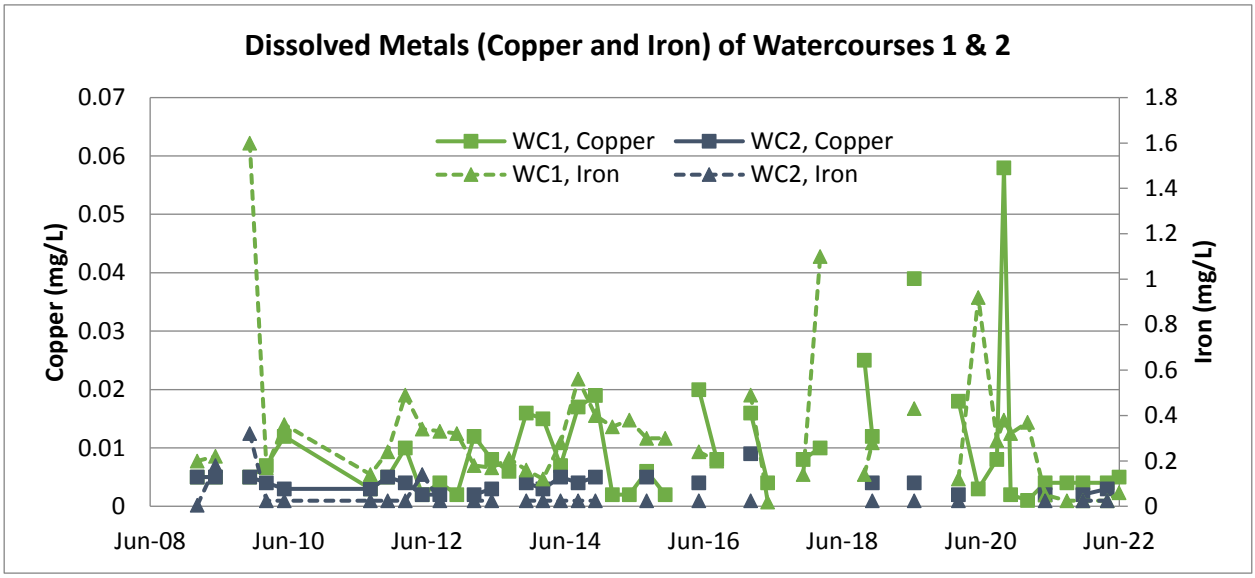
Alkalinity	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	266	298	359	31	117	300	N/A	N/A
WC2	139	167	195	121	202	406	N/A	N/A



Alkalinity levels in Watercourse 1 have increased in the current reporting period, demonstrating improved buffering capability, while for Watercourse 2 alkalinity levels have remained relatively stable. Both watercourses show considerable variability over the historical record, which has continued in the current reporting period.

Dissolved Metals (Copper, Iron)

Copper	2021/22 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	0.004	0.004	0.005	0.001	0.010	0.058	N/A	N/A
WC2	0.002	0.003	0.003	0.002	0.004	0.009	N/A	N/A
Iron	**2021/22 Reporting Period**			**Historical Results**			**DC limit**	**EPL limit**
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	<0.05	<0.05	0.060	0.019	0.341	1.600	N/A	N/A
WC2	<0.05	<0.05	<0.05	<0.01	0.048	0.320	N/A	N/A



Concentrations of dissolved metals in Watercourse 1 and Watercourse 2 were at very low levels during the reporting period, and generally below the limit of reporting for dissolved iron. All samples were within the historical ranges for the respective analytes and are consistent with the EIS predictions that there should be no deterioration in water quality. The extended metals suite was not required to be tested during the current reporting period for either watercourse.

3.3.4 Surface Water Monitoring Results Interpretation

Surface water flows have increased in the current reporting period with the improved rainfall conditions, and the increase in the water levels of the shallow groundwater system is likely to have also contributed. Flows at the monitoring point on Watercourse 1 have still been limited with the quarry pit now almost entirely encapsulating the catchment area of the watercourse above this point. This has led to a significant reduction in baseflows at this monitoring point, as was predicted in the EIS. With the reduction in baseflow, the water quality monitoring point was shifted approximately 20 metres downstream from June 2020 to a small old onstream farm dam constructed across Watercourse 1. This has allowed regular sampling of the water quality in Watercourse 1, however it has also meant that water quality results aren't directly comparable with previous monitoring, as the dam is subject to evaporative concentration between flow events.

While frequent flows have been recorded in Watercourse 2 in the current reporting period, these once again seem to be quite episodic, with high flows in some periods and no surface flows in others. This can be attributed to the extensive alluvial material present at this sampling site, which has fostered extensive grass growth along the "bed" of the watercourse. While no surface water flows have been recorded on just under half of the sampling events, it is likely that the accumulation of alluvium here is supporting significant hyporheic flows, with flows regularly observed below a grade-controlling waterfall approximately 100 metres downstream.

The water monitoring program has demonstrated that in the current reporting period, water quality of quarry pit discharges and in the watercourses complies with the applicable requirements of the DC and EPL, and demonstrates no deterioration in water quality as predicted in the EIS for the project. It is envisaged that surface water discharges from the quarry pit will continue in line with the current reporting year, with the quarry pit now enlarged to its full footprint. Current procedures allow for an accurate representation of any longer term trends in surface water quality and any potential impacts on surface and groundwater quality in areas adjacent to the quarrying operations.

3.4 Air Quality Monitoring

3.4.1 Standards and Performance Measures

The Development Consent contains specific limits relating to air quality, including for particulate matter and total suspended particulates, while the Environmental Protection Licence contains specific requirements for the monitoring of deposited ash and insoluble solids with no specific compliance limits listed in the EPL. Section 5.8 of the QEMP details the air quality testing requirements and specifies that four depositional dust gauges and one PM_{10} High Volume Air Sampler are used to measure compliance against the criteria. The locations of these monitoring sites, monitoring frequencies, and DC compliance are as follows:

EPL ID Station ID	Location	Analyte	Units	Frequency	DC Limit
1 APD1	Within 100m of the premises entrance gate	Ash Insoluble Solids	$g/m^2/mth$	Monthly	N/A
2 APD2	Rinker property, north west of Kyawana	Ash Insoluble Solids	$g/m^2/mth$	Monthly	N/A
3 APD3	Dunsters Land, southwest of The Cottage	Ash Insoluble Solids	$g/m^2/mth$	Monthly	N/A
8 APD4	Northern boundary, east of the gate to Belmont	Ash Insoluble Solids	$g/m^2/mth$	Monthly	N/A
N/A HVAS	Belmont homestead	PM10	$\mu g/m^3$	24hr every 6 days Annual average	50* 30

* Incremental impact – increase due to development on its own

3.4.2 Environmental Performance

CB has implemented a range of controls to minimise the potential generation of dust from the project, as described in the QEMP. The Air Quality Monitoring Program is also in place as described above to assess the effectiveness of these controls. ALS Laboratory Group were engaged during the reporting period to service these monitoring stations, with depositional dust assessed in accordance with *AS/NZS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulates – Deposited Matter – Gravimetric Method.* Samples collected from the HVAS are collected on a monthly basis for sampling in accordance with *AS/NZS3580.9.6-2015: Methods for Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM10 High Volume Sampler with Size Selective Inlet – Gravimetric Method.*

3.4.3 Air Quality Monitoring

Deposited Dust

The following table provides a summary of concentrations of Total Insoluble Solids and Ash (g/m^2/month) for the four deposited dust monitoring gauges at the Albion Park Quarry.

Insoluble Solids	2021/22 Reporting Period			Historical Results			EIS Average Prediction
	Min	Ave	Max	Min	Ave	Max	
APD 1	2.4	6.7	10.4	0.1	4.9	26.8	<= 2.6
APD 2	0.4	1.7	5.3	0.1	2.5	12.6	<= 3.5
APD 3	0.1	0.9	2.1	0.1	1.5	8.6	<= 2.2
APD 4	0.3	1.7	7.3	0.1	2.1	13.3	<= 3.2

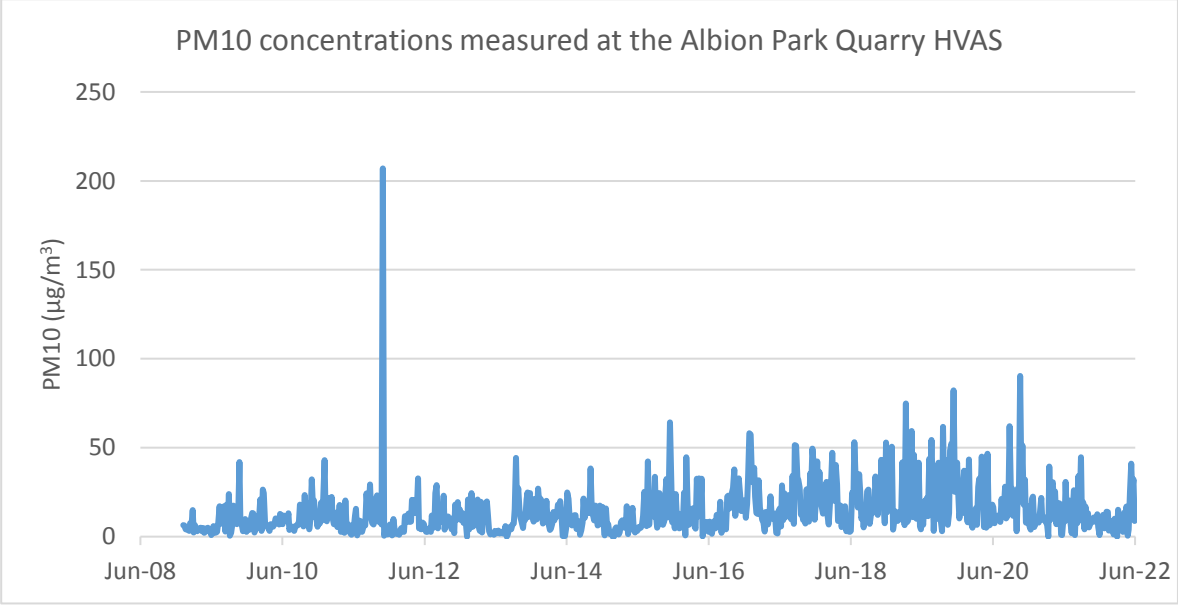
PM_{10}

The following table provides a summary of PM_{10} concentrations (µg/m^3) for the High Volume Air Sampler at the Albion Park Quarry, with the following graph showing the historical trend in PM_{10} concentrations. Incremental impacts were determined by subtracting the average PM10 levels measured by the Illawarra region OEH air quality monitors (TEOM units) from the data recorded by the site HVAS unit.

HVAS PM_{10}	2021/22 Reporting Period				Historical Results		
	Min	Ave	Incr. max	Max	Min	Ave	Max
HVAS#	0.0	12.0	36.4	44.7	0.0	14.5	207.0
DC criteria		30	50*				
EIS Prediction		<25					

total PM_{10} measured at the site – not incremental impact

* Limit applies to incremental impact – increase due to development on its own



3.4.4 Air Quality Monitoring Results Interpretation

Average annual deposited dust measurements in three of the four monitoring gauges show levels approximately consistent with the longer term average, and lower than the EIS predictions. The fourth gauge (DDG1), is located at the entrance to the site, and has experienced dust contributions from the Albion

Park Rail bypass motorway project over recent years. Due to the close proximity of the gauge to the motorway construction, the results recorded by this gauge are not expected to be indicative of dust impacts directly attributable to the Albion Park Quarry, nor dust deposition in the sensitive receivers to the north of the site. These works have now finished, and dust levels are continuing to decline without this external contribution. The above average rainfall throughout the year has contributed to the lower than average dust deposition recorded in the other gauges during the current reporting period.

All 24-hour measurements of total PM_{10} were less than the 24-hour incremental impact criteria (50 µg/m^3) during the reporting period. Once again the above average rainfall has assisted these results, as the background PM_{10} generally remained low without any extraordinary natural events (such as dust storms or bushfire smoke) during the period. The average annual PM_{10} was 12.0 µg/m^3, which is significantly less than the impact criteria of 25 µg/m^3, and represents the lowest result in several years, despite quarrying activities occurring much closer to the monitor than in previous years. It is also a significant reduction from the average of 18.0 µg/m^3 recorded in the previous reporting period.

Cleary Bros is in the process of establishing real-time particulate monitors at three locations around the site. While Cleary Bros have been able to achieve excellent correlation at times between the real time air quality monitors and the HVAS over shorter periods (up to two months), efforts over the past two years have not yet been able to demonstrate a reliable and consistent long term alignment between the measurement devices. Nevertheless, the real time monitors are already serving as a management tool for the quarry, with the alerting function allowing the quarry personnel to respond to short term changes in air quality. Cleary Bros will continue working to demonstrate correlation of these units with the HVAS, however if unsuccessful will look to deploy as a management tool only, rather than the original aim of using them as a compliance tool. In the interim, Cleary Bros will continue to operate the existing air quality monitoring network, including dust deposition gauges and the HVAS unit.

3.5 Noise Monitoring

3.5.1 Standards and Performance Measures

The Development Consent specifies limits on noise generated by the quarry operations at four sensitive receptors surrounding the project site. There are no specific requirements related to noise or noise monitoring in the EPL for the project. Section 5.5 of the QEMP details these noise monitoring requirements and with the DC compliance limits as follows:

Receiver Locations	Noise Limits $L_{Aeq15minute}$		
	Stages 1-2	Stages 3-4	Stages 5-6
“The Hill” residence (Dunster premises)	35	38	35
“The Cottage” residence (Dunster premises)	35	38	35
Approved rural worker’s dwelling (Dunster premises)	35	38	35
Greenmeadows residential estate	41	41	41

The above noise limits apply to operational noise under conditions of wind speeds (10 m above ground) of up to 0.5 m/s and temperature gradients of up to 0°C per 100 metres. To measure the noise levels at these sensitive receptors, CB has engaged SLR Consulting Australia Pty Ltd to undertake an annual survey of noise levels related to quarrying and processing operations. To ensure the measured noise levels are related to project noise only (and exclude non-project or background noise), unattended monitoring was undertaking in close proximity to the noise-generating activities on site for a period of 15 days during August 2021. Measured noise levels were then modelled for the sensitive receptors based on most recent noise model for the project, to calculate the project-related noise impacts at the sensitive receivers. Technician-attended noise monitoring was undertaken to supplement and verify the unattended noise monitoring, however the weather conditions at the time of monitoring were outside of those nominated in the Development Consent, despite the best efforts of the monitoring technician.

3.5.2 Environmental Performance

CB has constructed a three metre high and 350 metre long visual/acoustic bund along the north-eastern corner of the Quarry Extension to attenuate noise transmission in the direction of the closest sensitive receptors to the quarrying operation. Furthermore operations were restricted to the approved hours of operation as per the DC during the current report period. The annual Noise Monitoring Program is also in place, as described above, to verify the adequacy of noise mitigation measures on site.

3.5.3 Noise Monitoring Results

The annual noise survey was conducted in August 2021. During the survey, prevailing weather conditions were at times outside those nominated in the development consent, with the consequence that the limits indicated were not always applicable. Interpolation of the dataset with the data gathered from the onsite meteorological station allowed the extraction of noise monitoring data under conforming weather conditions. Based on this extracted dataset, the noise contribution from quarrying and processing operations at each of the sensitive receptors is outlined in the table below. For further information, see Annexure F, which refers to the complete Noise Monitoring Report. Monitoring results from the previous 2 annual surveys are also included for comparative purposes.

Monitoring Location	2021 results	Criteria (stages 5-6)	EIS Prediction	2020 results	2019 results
The Cottage	33	35	N/A	34	33
The Hill	32	35	33	35	31
Greenmeadows Estate	40	41	41	41	41

3.5.4 Noise Monitoring Results Interpretation

All modelled noise levels based on actual measurements in the quarry and the processing plant are within the relevant DC criteria. Modelled noise levels at all sensitive receivers in the current reporting period were comparable to those predicted by the EIS, and are similar to the previous years results. Noise levels from quarrying and processing operations at the Cleary Bros project have continued to be within acceptable limits during the current reporting period.

3.6 Blast Monitoring

3.6.1 Standards and Performance Measures

The Development Consent and Environmental Protection Licence for the project are consistent in their approved blasting criteria at nearby sensitive receptors. Section 5.7 of the QEMP details how these criteria are to be met, with a blast monitoring station permanently installed adjacent to the nearest non-project related sensitive receptor, The Cottage residence on the neighbouring Fig Tree Hill property. These criteria are described in the table below. When blasting is to occur within 40 metres of the northern boundary of the quarry property, a portable blast monitor is also located at the property boundary at the point closest to the blast. The DC and EPL also set restrictions on the timing of blasts and blast frequencies.

Monitoring Location	Maximum Airblast Overpressure dB(L Peak)	Maximum Peak Particle Velocity mm/s	Allowable Exceedance
At any point located at least 3.5 metres from any residence on privately owned land	115	5	5% of the total number of blasts over any 12 month reporting period.
	120	10	0%
At the southern boundary of the Figtree Hill land	135	200	0%

3.6.2 Environmental Performance

Airblast overpressure and vibration from blasting was consistent with the limits in the table above, reproduced from the QEMP. All blasting was undertaken between 9am and 5pm on weekdays only, with no more than one blast per day undertaken during the current reporting period. Prior to the initiation of all blasts, the blasting methodology as described in the Blast Management Plan, including community notification via phone calls and an update to the website, as well as the design and sequencing of blast initiation to achieve the DC criteria. All blasts were monitored as per the requirements of the DC, with the results of this monitoring published on the Cleary Bros website and discussed with community representatives through the Albion Park Quarry Community Consultative Committee.

3.6.3 Blast Monitoring Results

Blast monitoring results for the 2021-2022 reporting period from the permanent blast monitor at *The Cottage* are summarised in the table below. No blasting occurred within 40 metres of the boundary of the property during the reporting period. A complete record of blast monitoring results for the period is included as Annexure E.

Blast Monitoring	2021/22 Reporting Period					Historical Results		
	# blasts	Average	95th %	# > 95th %	Max	Average	95th %	Max
Overpressure (dbL)	26	105.4	110.7	0	110.7	104.0	111.7	115.6
DC limits			115		120			
EIS Prediction			< 115					
Vibration (mm/s)	26	2.13	4.03	0	4.57	1.69	3.62	7.39
DC limits			5		10			
EIS Prediction			< 5					

3.6.4 Blast Monitoring Results Interpretation

All blast monitoring results have been below the criteria specified in the QEMP. The highest airblast overpressure level recorded at the permanent blast monitor at The Cottage was 112.2 dB(L), below the DC/EPL lower criteria and EIS prediction of up to 115 dB(L). The highest vibration recorded at the permanent blast monitor at The Cottage was 4.57mm/s, below the DC/EPL lower criteria and EIS prediction of up to 5mm/s. The average vibration and air overpressure as well as the 95th percentile for vibration for the current reporting period were slightly higher than the historical average, reflecting blasting in closer proximity to the monitor during the current reporting period. However the 95th percentile air overpressure and maximum results for vibration and air overpressure recorded in the current reporting period were slightly less than the historical results, suggesting effective implementation of blast management measures. The current blast monitoring program and blasting processes have been effective in ensuring blasting at the Albion Park Quarry meet compliance requirements, while reducing the disturbance to neighbours as far as practical considering continuing quarrying activities and the current progression of the quarry pit being at its closest point to the nearest sensitive receptor.

3.7 Ecological Monitoring

3.7.1 Standards and Performance Measures

The Development Consent requires the implementation of a Vegetation Management Plan, to provide a detailed plan for the protection, management and enhancement of the ecosystems and native flora and fauna adjacent to the Albion Park Quarry Extension, and for monitoring the effects of quarry operations on these communities. Section 5.10 of the QEMP outlines how the requirements of the DC are to be met, including the implementation of the Vegetation Management Plan for the project. The Vegetation Management Plan also requires that Cleary Bros engage an ecologist on a biannual basis.

The purpose of the biannual inspection is to provide expert feedback on the efforts to improve the biodiversity of the Vegetation Management Areas, and in particular guide activities in the Revegetation Areas. The ecologist will prepare a written report following each inspection, which will cover matters such as compliance with this management plan and any adverse environmental impacts, any recommendations and any additional mitigation measures considered necessary. The report will also include the number and species of seedlings planted since the last inspection, the condition of the fences, the number of hours spent controlling pest species, and any other relevant matter.

The annual inspection in June each year will include a quantitative survey of the Vegetation Management Areas. The survey is designed to assess the health of the Remnant Vegetation and the performance of the management strategies outlined in the VMP. Surveys will be undertaken in each of the 7 monitoring plots established in the remnant vegetation, as well as the monitoring plot in the Restoration Zone and one monitoring plot established in each of the Planting Zones.

There is no requirement in the EPL for ecological monitoring.

3.7.2 Environmental Performance

Revegetation activities during the current reporting period were focused on maintenance of establishing vegetation in the revegetation zones (1-5) as well as primary weed control in the remnant forest areas. Come additional infill planting was undertaken in Zone 5 to improve the diversity and abundance of the previous years plantings. Weed control across all areas was undertaken to encourage native plant growth, with both primary control of woody weeds and ascending vines, as well as targeted control of exotic grasses and annuals around recent plantings, and some high priority weeds identified on site (Cape Broom, Blackberry).

Revegetation contractors from Good Bush Pty Ltd were engaged to assist with these efforts. An ecologist from Good Bush Pty Ltd undertook the biannual inspection (Annexure C) and annual survey (Annexure D) of the vegetation management areas. The thirteen permanent survey plots were surveyed as part of the annual survey.

A summary of key observations from the annual survey are as follows. For further information, refer to the annual survey report included as Annexure D.

Survey method

The four corners of a 20 metre x 20 metre monitoring plot were marked with survey pegs and the GPS location of the centre of each plot was recorded using a handheld instrument. A wide-angle photograph was taken looking diagonally across the plot from the northeast corner peg.

Each plant species within the plot was identified to genus and species and the abundance and percentage cover of each species within the plot recorded.

Notes were made on the presence of significant species, evidence of browsing by feral animals and general condition of the vegetation. The survey data for the 13 survey plots along with a photograph of each plot are provided.

Significant flora species

Several listed threatened plant species and a number of regionally rare species were recorded in the vegetation management plan. During the assessment for this report the following information was gathered in relation to presence and condition of these significant plant species:

Common Name	Botanical Name	Condition
Threatened Species		
White Wax Flower	*Cynanchum elegans*	The population of Cynanchum elegans within Plot 5 was senescing when initially recorded and had since died due to increased canopy cover. The site survey this year identified an additional population nearby to this at the following coordinates: E 300418, N 6170411
Illawarra Zieria	*Zieria granulata*	Not observed
Illawarra Socketwood	*Daphnandra johnsoni*	Large population with many suckering stems identified within plot 8.2. Population healthy and expanding
Scrub Ironwood	*Gossia acmenoides*	Not observed
Regionally Rare Species		
Native Holly	*Alchornea ilicifolia*	Common and abundant, regenerating
Actephila	*Actephila lindleyi*	Not observed
Scrub Wilga	*Geijera salicifolia*	Common and abundant, regenerating
Olivers Sassafras	*Cinnamomum oliveri*	Single plant observed within plot 8.2
Myrtle Ebony	*Diospyros pentamera*	Single plant observed within plot 8.1

Weed control

Weeds have proliferated within the fenced revegetation areas (Zones 1,2,3) since the last report but the majority of these weeds are annual weeds and grasses. Weed control has been carried out within these areas but the focus has been to control annual weeds and grasses around the base of establishing trees to reduce competition. This method will see a reduction in overall weed control requirements once the trees have become established and there is reduced light availability for annual weeds to colonise.

Woody weeds such as Lantana and Wild Tobacco were observed within some zones of the rehabilitation areas and Moth Vine is evident due to its high seed production and wind dispersed method. Treatment of woody weeds within this site should follow the Bradley method of working from areas of intact canopy and minimal weed encroachment toward the areas where weed frequency is higher.

The most severe weed impact within this site is the Madiera Vine that appears to originate within zone 6 and is present along the riparian corridor within zones 6,7 and 8. Madiera Vine is a very challenging weed to treat once established and the populations within this site will take considerable time and effort to control.

Condition of fences

All fencing observed appears to be in good condition.

Absence of spoil or rubbish

There is little rubbish present on site with small amounts of wind blown rubbish observed.

Animal or human interference

Grazing was observed within the fenced areas however this is most likely the result of Wallabies and Eastern Grey Kangaroo that have the ability to jump or find ways under these fences. There was no evidence that goats have entered the fenced compounds.

Riparian zone

Water from the quarry has been emptying intermittently into the creek to the south for several years. This is quite variable, depending upon local rainfall and the need to de-water the quarry. In recent years, rainfall has been considerably lower than 'normal' so the need to pump water to the creek has been diminished. Inspection of the creek below the outlet pipe found no obvious negative impact from the quarry water (KMA 2018).

Planting Records

Planting was carried out during this period over two work days. Infill planting was carried out within the Zone 5 planting compound on 17/11/2021.

Species planted and numbers include:

- *Toona ciliata* (Red Cedar) 17
- *Brachychiton acerifolius* (Illawarra Flame Tree) 20
- *Eucalyptus tereticornis* (Forest Red Gum) 40
- *Ficus macrophylla* (Moreton Bay Fig) 9

Planting was also carried out within the pit to establish canopy and exclude weeds below the crib hut. A range of various local native species were used or this revegetation work. The species planted included Red Cedar *(Toona ciliata*), Forest Red Gum (*Eucalyptus tereticornis*) and Illawarra Flame Tree (*Brachychiton acerifolius*). A total of 120 of the above species were the above species were planted within this area.

Zone 2 monitoring point showing establishment of vegetation

3.7.3 Compliance Assessment

The following recommendations were made by the ecologist as part of the annual survey, which will form the basis of revegetation efforts in 2022-23:

- Treatment of woody weeds and invasive vines within the Zones 1, 2, 3 compound using the cut and paint method and mulching materials on site after removal of required plant propagules
- Treatment of Lantana working from areas of good bush toward the more weed infested areas within all but the planted zones
- Treatment of Madeira Vine to control further spread of this highly invasive weed from Zone 6 downstream. The severity of the Madiera Vine infestation at this site is very high and an integrated pest management approach will be required in the future using weed control, biological controls and mechanical controls to impact and reduce this population
- Continued revegetation maintenance around plantings to assist canopy establishment to eventually exclude annual weeds and grasses
- Priority maintenance of compounds 1, 2 and 3 targeting the regeneration of Lantana (*Lantana camara*), Wild Tobacco (*Solanum mauritianum*), Turkey Rhubarb (*Rumex sagittatus*) and Moth Vine (*Araujia sericifera*)
- Maintain planting within Zone 5 compound and infill planting with a range of grassy woodland and rainforest canopy species
- Targeted frilling of invasive canopy species such as African Olive (*Olea europaea subsp. cuspidata*) and Orange Firethorn (*Pyracantha angustifolia*) within the entire site

4. COMMUNITY

4.1 QEMP Requirement

The Annual Review is to include a summary of complaints received during the past year comparing this to complaints received in previous years.

The EPL requires a legible record of all complaints relating to pollution incidents. Both the QEMP and the EPL specify a protocol to be followed in relation to complaints including recording action taken regarding the complaint.

4.2 Tabulated Results

Two environmental complaints were received during the current reporting period, both relating to blast noise and vibration. Each complaint was investigated to determine the cause and whether existing controls were adequate to reasonably minimise community impacts as a result of the project. Further information regarding each complaint is described in Section 4.3, while a comparison with previous years' complaints is summarised below.

Year	Environmental Complaints
2007/2008	1
2008/2009	2
2009/2010	0
2010/2011	5
2011/2012	6
2012/2013	4
2013/2014	2
2014/2015	5

Year	Environmental Complaints
2015/2016	2
2016/2017	7
2017/2018	6
2018/2019	3
2019/2020	14
2020/2021	3
2021/2022	2

4.3 Environmental Complaints Results Interpretation

A summary of the complaints received is provided in the table below:

Date	Description of Complaint	Status
8 February 2022	Complainant stated that blast 2/22 caused excessive shaking to house. Noise and vibration levels within approved limits.	Closed out
28 March 2022	Complainant alleges quarry blasting is causing disturbance. Cleary Bros advised the Complainant that all blasts have been undertaken within approved limits.	Closed out

Cleary Bros operates a Community Consultative Committee (CCC) for the Albion Park Quarry. Two formal meetings of the CCC were held in the current reporting period, in July and December, with minutes of these meetings available on the Cleary Bros website. A site visit was held as part of the December 2022 meeting, with an additional informal site visit held in May 2022 to view the area proposed for extraction as part of the Stage 7 Development Application, which was on public exhibition at the time of the site visit.

5. REVIEW OF MANAGEMENT PLANS

5.1 Water Management Plan

As indicated in the Development Consent, the Water Management Plan comprises:

- a Water Balance;
- an Erosion and Sediment Control Plan;
- a Surface Water Monitoring Program;
- a Ground Water Monitoring Program; and
- an Integrated Water Management Strategy, if the water balance shows a potential demand for water above that which can be collected from rainfall.

The various requirements of the WMP were addressed in the QEMP and associated documents. Parts a) and e) refer to the water balance, which predicted that the quarry could operate within a water budget capable of being satisfied from rainwater collected on site. The quarry has operated throughout the reporting period with a surplus of water. This surplus has been discharged following storm events in line with the conditions of the DC.

The Erosion and Sediment Control Plan was implemented during the construction phase of the quarry. Erosion and sediment controls will be monitored and maintained throughout the life of the quarry. The Erosion and Sediment Control Plan included in the current WMP was last updated in February 2021, and remains appropriate for the current site. Cleary Bros continues to look at modifications that can be made to reduce sediment loading in waterways leaving the site.

A review of the Water Management Plan has recently been undertaken, with the current revision approved by the DPE on 26th February 2021. This Water Management Plan remains current and relevant to the site, and will continue to guide water management practices on the site.

5.2 Blast Management Plan

The Blast Management Plan was most recently revised and approved by the DPE on the 15th November 2017. This Blast Management Plan remains current and relevant to the site, and will continue to guide blast management practices on the site.

5.3 Vegetation Management Plan

The Vegetation Management Plan applies primarily to the revegetation and restoration areas to the south of the quarry. These locations are the subject of management and maintenance throughout the quarry life. The Vegetation Management Plan was most recently updated and approved by the DPE on the 9th May 2018. A review of the Vegetation Management Plan undertaken as part of the Annual Review has identified that the approved Vegetation Management Plan remains current and appropriate for the site.

5.4 Rehabilitation Management Plan

The Rehabilitation Management Plan was most recently revised and approved by the DPE on 15th November 2017. Current progress towards site rehabilitation remains in accordance with the approved plan, which remains current and appropriate for the site.

5.5 Heritage Management Plan

The Heritage Management Plan was most recently revised and approved by the DPE on 18th December 2017. A review of the Heritage Management Plan undertaken as part of the Annual Review has identified that the current Heritage Management Plan remains current and appropriate for the site.

5.6 Waste Minimisation

Waste management at the quarry has been carried out as indicated in the QEMP. Waste generation has been minimised as far as practicable. Quarry overburden material has been retained for placement in the base of the excavation and used to create the final landform as described in the Rehabilitation Management Plan.

In this reporting period other waste including workshop waste, office waste and waste from personnel (food scraps etc) is separated where appropriate and separately removed for recycling or disposal. Waste oil from machinery and equipment used on site is collected and recycled through a specialist waste oil recycling contractor. The QEMP was updated during the current reporting period to reflect the current waste management practices of the site.

5.7 Air Quality Management Plan

The Air Quality Management Plan was most recently revised and approved by the DPE on the 13th December 2017. This revision included a significant change to the way ambient air quality is to be monitored on the site, and the way this monitoring will then feed back and influence activities on the site. During the period, Cleary Bros has continued efforts to demonstrate correlation between the real time monitors and the HVAS, and while good relationships have been achieved at times over shorter periods (up to 2 months), we have not been able to demonstrate a longer term consistency between the monitors. While Cleary Bros has not yet been able to demonstrate like-for-like performance against the HVAS unit, further work will be undertaken in the following year as we look to deploy these units in line with the commitments of the Air Quality Management Plan. In the interim, Cleary Bros will continue to operate the existing air quality monitoring network in line with the requirements of the Air Quality Management Plan, including dust deposition gauges and the HVAS unit. A review of the Air Quality Management Plan undertaken as part of the preparation of this Annual Review has identified that this plan remains current and relevant to site activities.

5.8 Noise Management Plan

The Noise Management Plan was most recently revised and approved by the DPE on the 15th November 2017. A review of this management plan undertaken as part of the preparation of this Annual Review, has identified that this plan remains current and relevant to site activities.

5.9 Transport Management Plan

The Transport Management Plan was most recently revised on the 21st September 2016 following an audit of the Quarry Extension by the DPE. A review of this management plan undertaken as part of the Annual Review process has indicated that no revision to the Transport Management Plan is required.

5.10Cumulative Traffic Impact Study

The Cumulative Traffic Impact Study was most recently revised on the 30th November 2015 following Mod 2 of the DC, in consultation with the Hanson Bass Point and Boral Dunmore quarries. A review of this study undertaken as part of the Annual Review process has indicated that the underlying assumptions of the study remain valid, and no revision to the Cumulative Traffic Impact Study is required.

5.11Bushfire Management Plan

The Bushfire Management Plan is included within the Quarry Environmental Management Plan, and describes preventative measures taken to limit the risk of bushfire, and equipment and processes in place to respond to any fires. A review of the Bushfire Management Plan undertaken as part of the Annual Review process has indicated that no revision is required at this stage.

6. INDEPENDENT ENVIRONMENTAL AUDIT

Cleary Bros mostly recently commissioned ERM to carry out an Independent Environmental Audit on 9 December 2020 covering the period 9 November 2017 to 5 November 2020. The report was submitted to the DP&E and was uploaded to Cleary Bros website and made publicly available.

In the Executive Summary of the audit report, ERM stated that "Cleary Bros has established the control systems generally required for the stage of development (operational). All staff interviewed demonstrated a high level of understanding of requirements and a commitment to the application of the requisite management systems and plans." The findings identified during ERM's Independent Environmental Audit were largely administrative in nature. The below table summarises the progress of the corrective actions undertaken to address the non-conformances of the 2020 Independent Environmental Audit. The next audit is scheduled for late 2023.

Condition Number	Auditor Comment	Auditor Recommendation	Progress of Corrective Actions
Sch 4 Cond 61	A 110 kl above ground storage tank containing diesel is located at the Site and the diesel, as currently stored on site, constitutes a dangerous good. AS1940 requires a suitable high level alarm (LAH) set at a maximum of 97% of tank capacity for tanks over 25,000 L capacity storing combustible liquids (e.g. diesel). The diesel tank onsite does not have a suitable high level alarm, therefore Cleary Bros does not meet this requirement.	Install a high level alarm (LAH) set at a maximum of 97% of tank capacity for the 110 kl diesel tank.	COMPLETED High level alarm installed on tank in conformance with AS1940
Sch 4 Cond 15	An exceedance of the 24-hour PM 10 criteria at the High Volume Air Sampler occurred on 23 September 2020. According to the Quality and Environment Manager, Cleary Bros undertook an investigation into the cause of the exceedance. The incident was reported to OPIE on 14 October 2020 and at the time of writing this report, Cleary Bros is awaiting a response from OPIE. ERM notes that results immediately before and after the exceedance were within criteria and the isolated exceedance event is not considered representative of widespread failure to manage particulate matter emissions.	Comply with direction from OPIE with regard to the reported 24-hour PM10 criteria exceedance.	No further action required.
Sch 3 Cond 11	It is recommended that future preventative maintenance for in-ground concrete infrastructure, such as tank bunds and water treatment plant sumps include integrity inspections to confirm that sumps are not leaking to the subsurface and secondary containment is in good working order.	Incorporate additional preventative maintenance for concrete bunds and sumps, comprising routine integrity inspections to confirm stored product is fully contained.	COMPLETED Preventative maintenance program updated to include physical inspections of bund. Inspections have since been undertaken.
Sch 4 Cond 29	A portion of the natural flow paths and vegetated buffers shown in Appendix C of the Water Management Plan, are no longer present onsite due to the expanded quarry pit. Erosion and	Review the sediment control plan (Appendix C) and update the plan to only describe controls that are	COMPLETED Erosion and Sediment Control Plan has been

Condition Number	Auditor Comment	Auditor Recommendation	Progress of Corrective Actions
	sediment controls in the Sediment Control Plan should be updated to describe current practicable onsite controls.	practicable given the current state of operations.	updated to align with with site layout.
Sch 4 Cond 59 EPL O5.1	ERM considers waste is being managed in accordance with the EPA and waste management is conducted generally in accordance with this condition, however there is no document that identifies and pre-classifies common waste streams generated by site operations.	Update the QEMP to identify the common waste streams generated by site activities and preclassify the material where possible in accordance with the EPA Waste Classification Guidelines.	COMPLETED QEMP has been updated to further describe current waste management practices.

7. NON COMPLIANCES

There were no non-compliances with the conditions of the Development Consent in the current reporting period.

There were two non-compliances with the conditions of EPL299 during the reporting period, which relate to the exceedance of the Total Suspended Solids limit for water overflowing from the Main Holding Dam on two consecutive days. At the time of this exceedance, flooding was experienced across many coastal areas of NSW, and a Disaster Declaration was in place for the Shellharbour City Local Government Area (amongst many other LGA's). Cleary Bros investigated the exceedances and determined that significant rainfall (>450mm) fell in the days immediately preceding and during the dam overflows, with accumulated runoff far exceeding the capacity of the dam. The investigation determined that the existing controls in place were appropriate for the site and were effective in reducing the risk of any harm given the circumstances of the severe weather event.

8. CONCLUSION

Quarrying and processing operations at the Cleary Bros (Bombo) Pty Ltd Albion Park Quarry have operated in line with the conditions of approval and the Environmental Protection Licence for the project in the current reporting period, with the exception of two non-compliances with the conditions of the EPL. These exceedances occurred during a period of extreme rainfall for which a Disaster Declaration was in place for the Shellharbour City LGA. These exceedances were investigated and it was identified that the existing controls in place were appropriate for the site and were effective in reducing the risk of any harm given the circumstances of the severe weather event. In general, management practices currently in place have been effective at reducing the impacts on surface water, groundwater, air quality, biodiversity, and the amenity of nearby sensitive receivers to acceptable levels.

Predictions and assumptions made as part of the Environmental Impact Statement have been shown to be largely valid, with most impacts less than that predicted in this original assessment.

Water monitoring has shown the receiving waters surrounding the Quarry Extension area are meeting compliance criteria, with no significant impact to groundwater and surface water resources. Monitoring of vegetation communities adjacent to the Quarry Extension has identified no observable sign of stress related to water availability or otherwise. Similarly, vegetation management strategies implemented in the current reporting year have been highly successful in boosting revegetation areas, with all areas now planted, and an extensive low-level canopy now forming in areas planted only five years ago.

Depositional dust and particulate matter monitoring have shown that the current controls to minimise dust generation on site have largely been effective at achieving compliance with DC and EPL criteria, with measured levels that can be attributed to the Quarry mostly below that predicted from the EIS for the project. Cleary Bros has also used the new air monitoring network to allow real-time proactive management to minimise emissions from the site, prior to full demonstration and commissioning of the network.

Modelling of noise impacts of the project based on measured noise levels have demonstrated compliance with the noise criteria of the DC. Similarly, measured blast overpressure and vibration levels have demonstrated that current management strategies related to blasting have been successful in reducing these impacts to below compliance criterion and EIS predictions for the current reporting period.

A review of all management plans and strategies was undertaken as part of the Annual Review process, with this review finding that all management plans are current and appropriate to site activities, as well as being consistent with DC conditions and company commitments.

Annexure A

Department of Regional NSW Return – 2020-2021

Extractive Materials Return 2020-2021

Regional NSW

Form S1 – Period Ending 30 June 2021

Quote RIMS ID in all correspondence

Quarry Id: 1290 Rims ID: 400492 Operators Name: CLEARY BROS (BOMBO) PTY LTD Address: PO BOX 210 PORT KEMBLA NSW 2505 Email: Quarry Name: ALBION PARK QUARRY Quarry Address: 81 EAST WEST ROUTE, CROOM NSW 2527	**Inquiries** please telephone: (02) 4063 6713 **Completed or Nil Returns** Email – mineral.royalty@planning.nsw.gov.au Postal Address (see below) ***Please amend name, postal address and location of mine or quarry if incorrect or incomplete.***

The return should be completed and forwarded to **Senior Advisory Officer, RESOURCE ECONOMICS, STRATEGY, PERFORMANCE & INDUSTRY DEVELOPMENT, DEPARTMENT OF REGIONAL NSW, PO BOX 344 HUNTER REGION MAIL CENTRE NSW 2310 on or before 31 October 2021**. If completion of the return is unavoidably delayed, an application for extension of time should be requested **before** the due date. If no work was done during the year, a **NIL** return must be forwarded.

The return should relate to the **above quarrying establishment** and should cover the operations of quarrying and treatment (such as crushing, screening, washing etc.) carried out at or near the quarry. A return is required even if the operations are solely of a developmental nature and whether the area being worked is held under a mining title or otherwise.

Director, Resources Policy

Please complete all the following information to assist in identifying the location of the Quarry

Typical Geology: Latite and Tuffaceous agglomerate

Nearest Town to Quarry: Albion Park Rail

Local Council Name: Shellharbour City Council

Deposited Plan and Lot Number/s of Quarry: Lot 1 DP858245, Lots 420 and 421 DP1252087

Email Address of Operator:

Name of Owner or Licensee: Cleary Bros (Bombo) Pty Ltd

Postal Address of Licensee: PO Box 210, Port Kembla NSW 2505

Licence/Lease Number/s (if any)

From Mining, Exploration & Geoscience (NSW Mineral Resources): N/A

From Crown Lands or other NSW Department: N/A

If any output was obtained from land NOT held under licence from the above Departments, state the Name/s and Address/es of the Owners of the land: Bridon Pty Ltd, PO Box 210, Port Kembla NSW 2505

To the best of my knowledge, information entered in this return is correct and no blank spaces left where figures should have been inserted.

- **SIGNATURE of PROPRIETOR or MANAGER** _____ **DATE:**
- **CONTACT PERSON for this return:**
- **NAME** (Block letters): **Telephone:**

Extractive Materials Return 2020-2021

NSW GOVERNMENT | Regional NSW

Form S1 – Period Ending 30 June 2021

Sales During 2020-2021

Production information may be published in aggregated form for statistical reporting. However, production data for individual operations is kept strictly confidential.

Product	Description	Quantity Tonnes
Virgin Materials		
Crushed Coarse Aggregates		
Over 75mm	**Armour Rock, spalls, shot rock, gabion, scour**	**28,078**
Over 30mm to 75mm	**70mm crushed rock, rock fill, ballast**	**19,781**
5mm to 30mm	**20mm, 14mm, 10mm, 7mm, 5mm aggregates and blends**	**294,407**
Under 5mm	**Crusher dust and related products, bedding sand**	**209,632**
Natural Sand		**0**
Manufactured Sand	**Manufactured sand**	**9,395**
Prepared Road Base & Sub Base	**DGB, DGS, SMZ**	**202,591**
Other Unprocessed Materials		**0**
Recycled Materials		
Crushed Coarse Aggregates		
Over 75mm		**0**
Over 30mm to 75mm		**0**
5mm to 30mm		**0**
Under 5mm		**0**
Natural Sand		**0**
Manufactured Sand		**0**
Prepared Road Base & Sub Base		**11,760**
Other Unprocessed Materials		**0**
River Gravel		**0**
Over 30mm		**0**
5mm to 30mm		**0**
Under 5mm		**0**
Construction Sand	Excluding Industrial	**0**
Industrial Sand		**0**
Foundry, Moulding		**0**
Glass		**0**
Other (Specify)		**0**
Dimension Stone	Building, Ornamental, Monumental	**0**
Quarried in Blocks		**0**
Quarried in Slabs		**0**
Decorative Aggregate	Including Terrazzo	**0**
Loam	Soil for Topdressing, Garden soil, Horticultural purposes)	**434**
TOTAL SITE PRODUCTION		**776,078**
Gross Value ($) of all Sales		
Type of Material	**Latite and tuffaceous agglomerate**	
Number of Full-Time Equivalent (FTE) Employees	**Employees: 30**	**Contractors: 10**

Please Note: A return for clay-based products can be obtained by contacting the inquiry number.

Regional NSW | 2

Annexure B

Environmental Monitoring Locations

FIGURE 3 Monitoring Locations

Annexure C

Biannual Ecological and Rehabilitation Monitoring

Good Bush Pty Ltd – December 2021

Good Bush Pty Ltd
41 Gloucester Crescent
Dapto NSW 2530
Phone: 0406 215 823
ABN: 94 169 923 246
Email: brookscreekdapto@gmail.com

Mark Hammond
Quality and Environment Manager
Cleary Bros (Bombo) Pty Ltd
39 Five Islands Road (PO Box 210)
Port Kembla NSW 2505

Dear Mark

Please see attached results of the biannual inspection at Cleary Bros Albion Park Quarry carried out on 20/01/2022

Yours Sincerely

Marcus Burgess

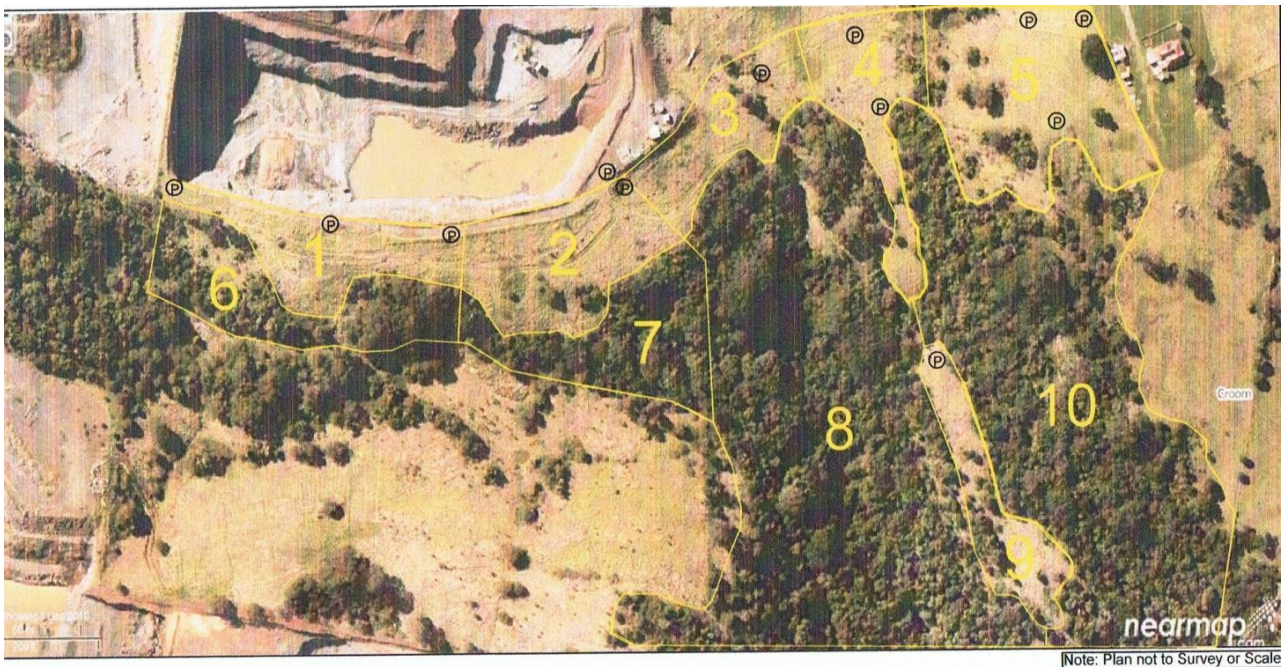
Manager – Good Bush Pty Ltd Natural Area Restoration

Cleary Bros Albion Park Quarry Biannual Inspection Report

Introduction

This report is a biannual evaluation of the bushland restoration works being carried out at Cleary Bros Albion Park Quarry.
A site inspection of the management areas was carried out on 20th January 2022 by Marcus Burgess and an evaluation of the success and failures of the recent works was carried out. These will be outlined below as well as recommendations for the future management of the sites.

Site Map



Management Zones

Zone 1, 2, 3

Zone Description

These zones consist of revegetation areas on the immediate southern side of the quarry pit. The majority of these areas have been fenced and revegetation works have been carried out over a number of years.
Prior to revegetation these areas were cleared of native vegetation and consisted of open pasture with a number of annual weeds and weed grasses present. Prior to planting these areas were heavily mulched to assist plant establishment and exclude weeds.
The plants that have been installed within these zones include a small number of species such as Red Cedar, Cabbage Gum, Maidens Wattle and Prickly Paperbark. The Cabbage Gums have become susceptible to pests and diseases and the growth rates appear to have stunted from their original performance. All other species that have been planted within these areas have succeeded and are putting on new growth due to the recent rains.

Completed Works

Works completed within these zones in the previous six months have consisted of:

- Treatment of woody weeds and ascending vines within the fenced compound
- Maintenance of plant protection cages including reinstating fallen cages and adjusting hardwood stakes and pegs
- Removal of annual weeds and grasses growing at the base of trees to assist establishment

Recommendations

The following management actions will be required within this zone:

- Planting additional canopy species at the western end of the fenced compound
- Infill planting with pioneer species throughout all other areas within the fenced compound to increase floristic diversity and reinstate natural regeneration processes
- Isolation of planted trees by removing annual weeds and grasses around the base of establishing trees to minimise competition for available moisture and light and to assist plant establishment
- Treatment of woody weeds such as Lantana, Inkweed (*Phytolacca octandra*) and Paddy's Lucerne (*Sida rhombifolia*) within the planted areas using the cut and paint method
- Treatment of highly invasive weed grasses including Red Natal Grass (*Melinis repens*) and Fountain Grass (*Pennisetum setaceum*) using hand removal and spraying methods

Zone 4, 5

Zone Description

These zones previously consisted of mostly unworked grassy woodland remnants with large infestations of woody weeds existing around the perimeter and within the woodland areas and a high frequency of African Olive (*Olea europaea* subsp. *cuspidata*) trees at the northern boundary. Extensive planting has been carried out within these zones over the previous 24 months. Infill planting was carried out on 17th November within the fenced compound adjacent to the Belmont property with plants sourced form Jamberoo Native Nursery to replace failed stock.

Completed Works

Works completed within these zones in the previous six months have consisted of:

- Treatment of Broom (*Genista monspessulana*) throughout the bund at the top of the quarry pit prior to seeding to comply with IDWA orders
- Treatment of woody weeds and ascending vines within Zone 4 and 5 fenced compounds
- Frilling of African Olive and Privet within the Zone 5 compound
- Maintenance of plant protection cages including reinstating fallen cages and adjusting hardwood stakes and pegs
- Removal of annual weeds and grasses growing at the base of trees to assist establishment
- Infill planting with trees supplied by CB from Jamberoo native Nursery to replace failed stock in the Zone 5 fenced compound.

Species planted and numbers:

Toona ciliata	Red Cedar	17
Brachychiton acerifolius	Illawarra Flame Tree	20
Eucalyptus tereticornis	Forest Red Gum	40
Ficus macrophylla	Moreton Bay Fig	9

Recommendations

The following management actions will be required within this zone:

- Treatment of woody weed incursions within the established canopy areas and around the perimeter of the rainforest remnants
- Assisted regeneration to assist expansion of the woodland remnants
- Additional treatment of large amounts of African Olive using frilling and cut and paint methods
- Continued revegetation maintenance to assist canopy establishment within Zone 4 and 5 fenced compounds
- Continued treatment of Broom and Blackberry to comply with IDWA orders

Zone 6, 7

Zone Description

These zones consist of previously unworked remnant subtropical rainforest on an ephemeral creek line with large infestations of woody weeds surrounding the perimeter of the established canopy areas. A large infestation of Madiera Vine (*Anredera cordifolia*) exists within the centre of Zone 7 that is thriving and expanding and will require treatment in the future. Spraying was carried out between these two zones to establish a trail to monitor water quality.

Recommendations

The following management actions will be required within this zone:

- Treatment of Madiera Vine using the scrape and paint method to reduce the further spread of tubers. Spray treatment of vines that are smothering the ground layer and follow up treatment over a number of years
- Treatment of woody weed incursions within the established canopy areas and around the perimeter of the woodland remnants
- Assisted regeneration to assist expansion of the rainforest remnants

Zones 8, 10

Zone Description

These very large zones consist of previously unworked subtropical rainforest and grassy woodland communities with large infestations of woody weeds surrounding the perimeter of the established canopy areas.
The rainforest communities within these zones contain a highly diverse range of subtropical rainforest species and some regionally rare local native species such as Actephila (*Actephila lindleyi*) and Pigeonberry Ash (*Elaeocarpus kirtonii*). The area immediately below the waterfall has an interesting assemblage of tree species with all five of the local Native Fig (*Ficus superba, rubiginosa, macrophylla, coronata, obliqua*) all represented within close proximity to each other. This contains a large stand the threatened species Illawarra Socketwood (*Daphnandra johnsonii*).
Due to the intact nature of these bushland remnants minimal planting will be required within these zones. Planting may be required in the future to create buffer edge plantings once the woody weeds have been removed. All works within these zones should focus on removal of weeds and assisted regeneration.

Completed Works

Works completed within these zones in the previous six months have consisted of:

- Primary weed control within Zone 8 adjacent to the Zone 4 planting compound on the ecotone between rainforest and woodland communities covering approximately 500m²

Recommendations

The following management actions will be required within this zone:

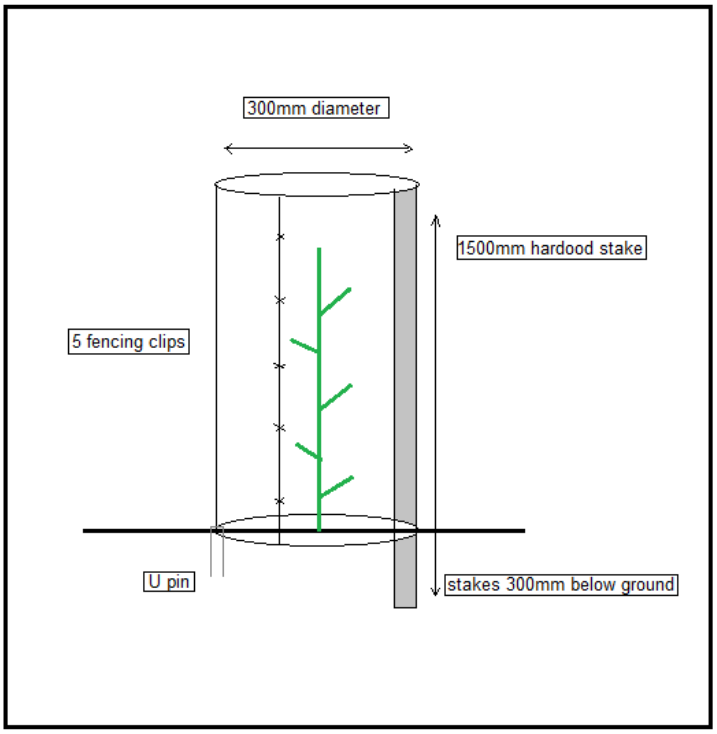
- Treatment of woody weed incursions within the established canopy areas and around the perimeter of the woodland and rainforest remnants
- Assisted regeneration to assist expansion of the rainforest remnants
- Monitoring for Madiera Vine populations that have been spread by floating tubers from Zones 6 and 7
- Treatment of large amounts of African Olive using frilling and cut and paint methods

Fencing

All fencing that has been installed round revegetation areas remains intact and has been effective at keeping goats out of the revegetation areas. Kangaroo and Wallaby however are not deterred by these fences and have been grazing within the compounds as evident by the occurrence of scats and grazing of annual weeds. Current wet conditions have seen a flourish of growth of annual weeds and grasses. Herbivores have been avoiding the revegetation areas as adequate feed plants can be found outside of the fenced compounds.

Installation of Plant Guards

Plant protection guards have been utilised within both Zones 1, 4 and 5 due to the heavy grazing by wallabies and kangaroo.
Chicken wire guards are recyclable and will be used in other revegetation areas in the future once the trees have become established. Cost for materials to purchase each individual chicken wire guard is $5.00 each. Construction of these guards is labour intensive and requires a significant amount of time. Cost per unit price for these guards including labour and materials is approximately $14.00 each. This cost is justifiable to protect the significant investment in purchase of and installation of trees. See below for chicken wire guard specifications:



Photographs

Good Bush staff carrying out revegetation maintenance within Zone 4 planted compound 23/06/2021

Good Bush staff carrying out revegetation maintenance within Zone 4 planted compound 23/06/2021

Good Bush Pty Ltd 41 Gloucester cres Dapto NSW 2530 Email:brookscreekdapto@gmail.com
ABN: 94 169 923 246 Phone: 0406 215 823

Annexure D

Annual Ecological and Rehabilitation Monitoring

Good Bush Pty Ltd – June 2022

2022

Albion Park Quarry Annual Monitoring Report

AUTHOR:

MARCUS BURGESS AND TANITA GORDON

DATE:

SURVEY PLOT: 8TH JUNE 2022

REPORT: 8TH JUNE 2022

Contents

Introduction

Good Bush Pty Ltd were engaged by Cleary Bros to produce a report for the annual monitoring and condition assessment of the natural bushland and revegetation areas of Albion Park Hard Rock Quarry.

The objective of this report is to assess the condition of the established monitoring plots and to provide management recommendations to assist establishment of plantings and natural regeneration of the conservation areas.

This report aims to meet the approval conditions of the NSW Land and Environment Court for the southern extension of the quarrying operational areas in 2006. A Vegetation Management Plan (VMP) was prepared for the site in 2007 and updated in 2018 (KMA) and this has guided the restoration of the site.

This report should be read in conjunction with "Vegetation Management Plan, Albion Park Hard Rock Quarry, Cleary Bros (Bombo) Pty Limited" and Kevin Mills & Associates (2018). Annual Inspection - June 2018, Vegetation Management, Albion Park Hard Rock Quarry

A condition of consent from the Court related to the implementation of the Vegetation Management Plan (VMP) states:

"*38. The Applicant shall include a progress report on the implementation of the Vegetation Management Plan in the AEMR*."

The Albion Park Quarry Environmental Management Plan (EMP) at Clause 7.7 requires reporting upon:

- The revegetation/rehabilitation areas shown on Appendix 1 of the LEC consent;
- The strip of riparian bushland immediately downhill from the quarry that could potentially be affected by changes to groundwater or surface water.

As noted in the EMP, the report shall comment on:

- Success of planted stock in the regeneration area;
- Natural seeding and growth of native vegetation in the restoration area;
- Weed control;
- Absence of spoil or rubbish;
- Any damage caused by animals or human interference;
- Recommendations for remedial action (if any)."

After a review of the Vegetation Management Plan (KMA 2007) which was subsequently approved by the Department of Planning and Environment. This has resulted in changes to the way the site is monitored; these new requirements are followed in this annual report.

The following requirements in the 2018 Vegetation Management Plan are relevant to the annual monitoring inspections.

5.1.2 Biannual Inspections

The ecologist will prepare a written report following each inspection, which will cover matters such as compliance with this management plan and any adverse environmental impacts, any recommendations and any additional mitigation measures considered necessary. The report will also include the number and species of seedlings planted since the last inspection, the condition of the fences, the number of hours spent controlling pest species, and any other relevant matter. The written reports will include feedback from the Quarry Manager and will be included in the Annual Review for the relevant reporting period.

5.1.3 Annual Survey

Surveys will be undertaken in each of the monitoring plots to be established in the remnant vegetation as described in Section 2.1.3, as well as a monitoring plot to be established in the Restoration Zone and one monitoring plot to be established in each of the Planting Zones shown in Figure 5 (once plantings have commenced in the respective zone). The corners of each 20m x 20m monitoring plot will be marked with survey pegs, and the location of the centre of each plot logged using a GPS.

A survey of the known populations of threatened species in the Vegetation Management Areas will be undertaken as part of the annual survey. The aim of this inspection will be to confirm the known threatened species on site have not been adversely affected by quarrying operations. An assessment will be made as to the health of the population, as well as confirming existing controls to prevent quarry incursion on the threatened species are effective

Good Bush Pty Ltd were engaged by Cleary Bros (Bombo) Pty Ltd and report on the progress in implementing the above conditions. The latest site inspections and surveys were carried out on 8th June 2022 for the purpose of addressing the requirements of the 2018 Vegetation Management Plan.

Site Location

Albion Park Hard Rock Quarry is located south of the East Week Link in Oak Flats. The total area of the hard rock quarry covered by this vegetation survey consists of approximately 9 hectares including bushland areas, revegetation areas and operational areas.

Location Map

Site Map

The rehabilitation areas were divided into 10 zones and the plan required 13 plots to be permanently established. The zones and location of the monitoring plots are shown on the map below (KMA 2018):

Survey Method

The four corners of a 20-metre x 20 metre monitoring plot were marked with survey pegs and the GPS location of the centre of each plot was recorded using a handheld instrument. A wide-angle photograph was taken looking diagonally across the plot from the northeast corner peg.
Each plant species within the plot was identified to genus and species and the abundance and percentage cover of each species within the plot recorded.

Notes were made on the presence of significant species, evidence of browsing by feral animals and general condition of the vegetation. The survey data for the 13 survey plots along with a photograph of each plot are provided.

Significant Plant Species

Several listed threatened plant species and a number of regionally rare species were recorded in the vegetation management plan. During the assessment for this report the following information was gathered in relation to presence and condition of these significant plant species:

Common Name	Botanical Name	Condition
Threatened species		
White Wax Flower	*Cynanchum elegans*	The population of Cynanchum elegans within Plot 5 was senescing when initially recorded and had since died due to increased canopy cover. The site survey this year identified an additional population nearby to this at the following coordinates: **E 300418 N 6170411**
Illawarra Zieria	*Zieria granulata*	Not observed
Illawarra Socketwood	*Daphnandra johnsonii*	Large population with many suckering stems identified within plot 8.2. Population healthy and expanding
Scrub Ironwood	*Gossia acmenoides*	Not observed
Regionally Rare Species		
Native Holly	*Alchornea ilicifolia*	Common and abundant, regenerating
Actephila	*Actephila lindleyi*	Not observed
Scrub Wilga	*Geijera salicifolia*	Common and abundant, regenerating
Olivers Sassafras	*Cinnamomum oliveri*	Single plant observed within plot 8.2
Myrtle Ebony	*Diospyros pentamera*	Single plant observed within plot 8.1

Weed Control

Weeds have proliferated within the fenced revegetation areas (Zones 1,2,3) since the last report but the majority of these weeds are annual weeds and grasses. Weed control has been carried out within these areas but the focus has been to control annual weeds and grasses around the base of establishing trees to reduce competition. This method will see a reduction in overall weed control requirements once the trees have become established and there is reduced light availability for annual weeds to colonise.

Woody weeds such as Lantana and Wild Tobacco have increased within some zones of the rehabilitation areas and Moth Vine is evident due to its high seed production and wind dispersed method. Treatment of woody weeds within this site should follow the Bradley method of working from areas of intact canopy and minimal weed encroachment toward the areas where weed frequency is higher.

The most severe weed impact within this site is the Madeira Vine that appears to originate within zone 6 and is present along the riparian corridor within zones 6,7 and 8. Madeira Vine is a very

challenging weed to treat once established and the populations within this site will take considerable time and effort to control.

Planting

Success of plantings has been variable within the different areas planted over the duration of the project. The plantings within Zones 1, 2 and 3 compounds have finally after many years of slow growth began to take off and the Red Cedars, Eucalyptus spp. and Melaleuca have all began to establish a tall canopy and will in time have canopy connectivity which will assist exclusion of ground weeds, annual weeds and grasses.

The more recent plantings within Zones 4 and 5 planting compounds have mostly remained fairly small and a loss of approximately 10% of these plantings has been observed. Some particular species are growing extremely well and this will be used as an indicator of species selection for future plantings.

Ongoing revegetation maintenance including lifting guards, hand weeding and spraying management rings will be required to further assist the establishment of these plantings.

Condition of Fencing

All fencing observed appears to be in good condition. 1 fallen tree evident on compound fencing nearest Plot 6.1.

Absence of Spoil or Rubbish

There is little rubbish present on site with small amounts of windblown rubbish observed.

Animal or Human Interference

Grazing was observed within the fenced areas however this is most likely the result of Wallabies and Eastern Grey Kangaroo that have the ability to jump or find ways under these fences. There was no evidence that goats have entered the fenced compounds.

Riparian Zone

Water from the quarry has been emptying intermittently into the creek to the south for several years. This is quite variable, depending upon local rainfall and the need to de-water the quarry. In recent years, rainfall has been considerably lower than ‘normal’ so the need to pump water to the creek has been diminished. Inspection of the creek below the outlet pipe found no obvious negative impact from the quarry water (KMA 2018)

Previous Works

The following works have been carried out at this site between July 2021 and July 2022:

Date	Area	Hours Worked	Work Description
1/10/2021	Zones 1,4	60 hrs	Continue primary weed control within woodland remnant around Plot 8.3 Revegetation maintenance at planting area in Zone 1 Spray tracks to water quality monitoring points
17/11/2021	Zone 5	56 hrs	Infill planting 86 various trees within Zone 5 planting compound All plants supplied form CB Gerroa quarry Water all plants Isolate all previously planted trees in preparation for spraying Spray management rings around all caged plants to reduce weed competition and assist establishment Treat all woody weed re-growth within Zone 5 planting area targeting Wild Tobacco and Lantana Sweep through bund above the pit targeting Cape Broom (*Genista monspessulana*) using the cut and paint method prior to IDNWA inspections in January. Plants currently flowering and minimal seed set so ideal time to target this population
22/03/2022	In the pit	91 hrs	Plant approximately 120 various trees below the crib room and on the southern side of the haul road in the pit Species planted consisted of *Brachychiton acerifolius, Toona ciliata, Eucalyptus tereticornis* Water all plants Secondary weed control targeting Lantana and ascending vines such as Moth Vine within zones 2 and 3 Slash and spray the tracks leading to the water monitoring points in Zone 2 and between zones 3 and 4
8/06/2022	Zones 4, 5	49 hours	Revegetation maintenance within the zone 4 and zone 5 planting compounds Lift all plant protection cages and hand weed grasses and annual weeds from around the base of plants in preparation for spraying management rings No spraying carried out on this particular day due to high winds and possibility of spray drift affecting planted trees Treat woody weeds Lantana and Wild Tobacco within the above compounds using the cut and paint method Visit all monitoring points and collect data for the Biannual Survey (Marcus and Tanita)
20/06/2022			Compiling data sheets and reporting for the Biannual Survey

Planting Records

Planting was carried out during this period over two work days. Infill planting was carried out within the Zone 5 planting compound on 17/11/2021. Plants were sourced by CB for this particular planting. Species planted and numbers include:

Botanical Name	Common Name	Number Planted
Toona ciliata	Red Cedar	17
Brachychiton acerifolius	Illawarra Flame Tree	20
Eucalyptus tereticornis	Forest Red Gum	40
Ficus macrophylla	Moreton Bay Fig	9
TOTAL		86

Planting was also carried out within the pit to establish canopy and exclude weeds below the crib hut. This work is not within the scope of this report but a range of various local native species were used or this revegetation work. The species planted included Red Cedar (*Toona ciliata*), Forest Red Gum (*Eucalyptus tereticornis*) and Illawarra Flame Tree (*Brachychiton acerifolius*). A total of 120 of the above species were planted within this area.

Recommendations

The following recommendations are made following the 2022 inspections:

- Treatment of woody weeds and invasive vines within the Zones 1,2,3 compound using the cut and paint method and mulching materials on site after removal of required plant propagules
- Treatment of Lantana working from areas of good bush toward the more weed infested areas within all but the planted zones
- Treatment of Madeira Vine to control further spread of this highly invasive weed from Zone 6 downstream. The severity of the Madiera Vine infestation at this site is very high and an integrated pest management approach will be required in the future using weed control, biological controls and mechanical controls to impact and reduce this population
- Continued revegetation maintenance around plantings to assist canopy establishment to eventually exclude annual weeds and grasses
- Priority maintenance of compounds 1, 2 and 3 targeting the regeneration of Lantana *(Lantana camara)*, Wild Tobacco *(Solanum mauritianum),* Turkey Rhubarb *(Rumex sagittatus)* and Moth Vine *(Araujia sericifera)*
- Maintain planting within Zone 5 compound and infill planting with a range of grassy woodland and rainforest canopy species
- Targeted frilling of invasive canopy species such as African Olive *(Olea europaea subsp. cuspidata)* and Orange Firethorn (*Pyracantha angustifolia)* within the entire site

Priority Weeds

The following invasive weed species were identified on this site and treatment methods for their removal. These weeds have been listed in their order based on their invasive potential:

Botanical Name / Common Name	**Control Methods**
Madeira Vine (*Anredera cordifolia*)	Scrape and paint large stems to kill tubers, hand remove tubers already in the soil
African Olive (*Olea europaea* subsp *cuspidata*)	Cut and paint and mulch small plants, frill larger trees
Cape Ivy (*Delairea odorata*)	Hand remove all stems and root points and raft materials in an elevated position until dry then mulch material on site
Moth Vine (*Araujia sericifera*)	Cut and paint and mulch materials on site after removal of viable and bagging fruit
Narrowleaf Firethorn (*Pyracantha angustifolia*)	Cut and paint and mulch small plants, frill larger trees
Wild Tobacco (*Solanum mauritianum*	Cut and paint and mulch materials on site after removal of viable seed
Lantana (*Lantana camara*)	Cut and paint and mulch materials on site

Photographs

Zone 2 monitoring point showing establishment of revegetation

Plot 6.1 showing little change from last years survey

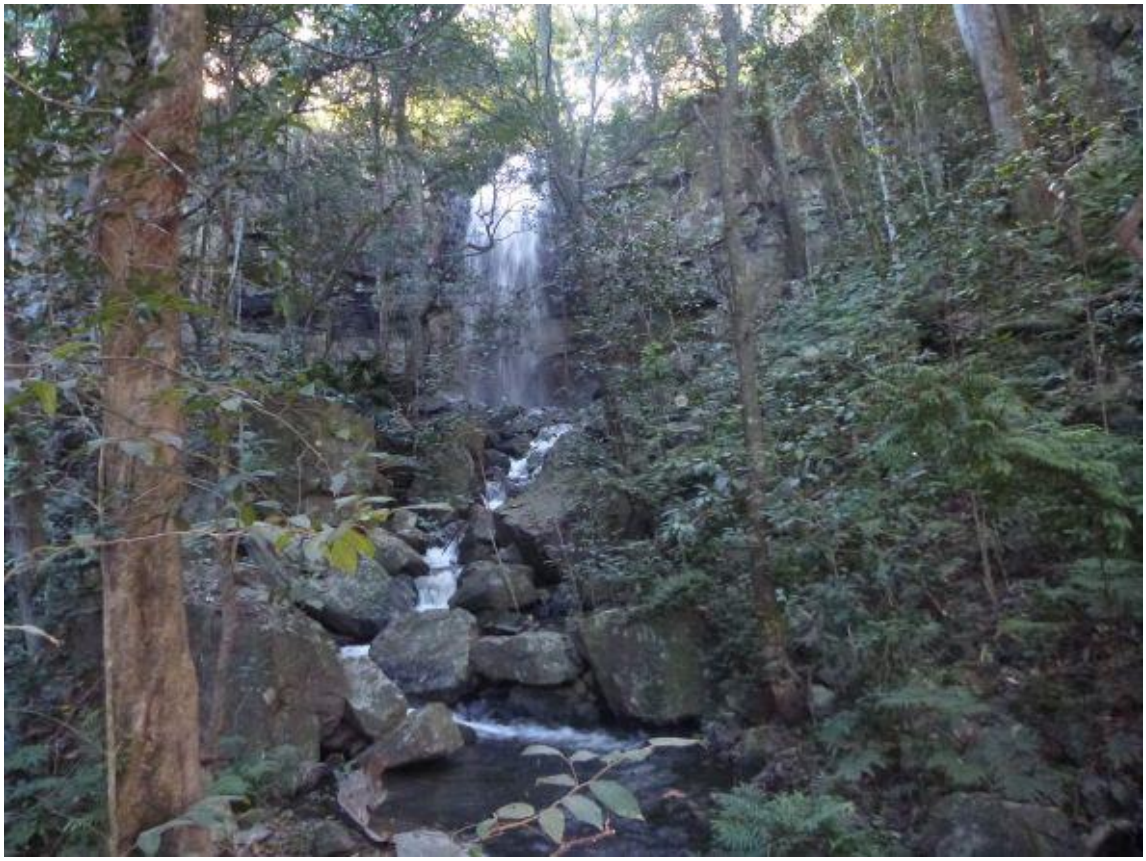
Plot 6.2 showing established intact canopy with little weed recruitment occurring

Plot 6.2 Moreton Bay Fig dominating the canopy and assisting to exclude weeds

Plot 10.2 showing little change from previous surveys

The newly established plot 4 Woodland treatment area showing areas where Lantana has been removed and regeneration of native grasses and groundcovers occurring

Plot8.2 with Established threatened pant species Illawarra Socketwood in good health



Water discharging from the pit and recent rainfall has bought the waterfall to life

Monitoring Requirements

Extract from Section 5 of the Vegetation Management Plan (2018).

"5.1.3 Annual Survey

The June (or thereabouts) inspection by the ecologist each year will include a quantitative survey of the Vegetation Management Areas, which will be included in the Annual Review. The survey is designed to assess the health of the Remnant Vegetation and the performance of the management strategies outlined in the VMP. Surveys will be undertaken in each of the monitoring plots to be established in the remnant vegetation as described in Section 2.1.3, as well as a monitoring plot to be established in the Restoration Zone and one monitoring plot to be established in each of the Planting Zones shown in Figure 5 (once plantings have commenced in the respective zone). The corners of each 20m x 20m monitoring plot will be marked with survey pegs, and the location of the centre of each plot logged using a GPS.

For each plot, the following will be recorded and reported in the annual report:

- Number of plantings surviving for each species (Revegetation Areas only);
- Number of plantings not surviving (Revegetation Areas only);
- Number of stems of each native species;
- Number of stems of each weed species;
- Percentage cover of weed species;
- Percentage foliage cover;
- Percentage ground cover;
- Abundance of threatened plant species or other plant species of conservation significance;
- Presence of threatened fauna species (including presence outside of marked plot;
- Pseudo-density of feral animals as determined by abundance and distribution of traces (scats, prints etc.); and
- Health of vegetation community (related to potential water stress).

A survey of the known populations of threatened species in the Vegetation Management Areas will be undertaken as part of the annual survey. The aim of this inspection will be to confirm the known threatened species on site have not been adversely affected by quarrying operations. An assessment will be made as to the health of the population, as well as confirming existing controls to prevent quarry incursion on the threatened species are effective."

Monitoring Field Sheets

Previous year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 1	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170338	GPS Easting	0300051
GPS Accuracy	+ - 6m	GPS Elevation	95m
Vegetation Community: Western revegetation area			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Ehretia accuminata	U	<5%	*Cenchrus clandestinus*	C	90%
Acacia maidenii	U	<5%	*Sida rhombifolia*	C	5%
Geranium homeanum	U	<5%	*Araujia sericifera*	O	5%
Geitonoplesium cymosum	U	<5%	*Chloris gayana*	O	10%
Juncus usitatus	U	<5%	*Phytolacca octandra*	O	5%
Dichondra repens	U	<5%	*Brassica sp.*	O	5%
Oplismenus aemulus	U	<5%	*Lantana camara*	O	5%
Acacia implexa	U	10%	*Ehrharta erecta*	U	5%
Streblus brunonianus	I	<5%	*Cynodon dactylon*	U	5%
Synoum glandulosum	I	<5%	*Melinis repens*	U	5%
			Verbena bonariensis	U	5%
			Sonchus oleraceus	U	5%
			Gomphocarpus fruticosus	U	5%
			Conyza sumatrensis	U	10%
			Lactuca serriola	U	5%
			Lysimachia arvensis	U	5%
			Cenchrus setaceus	I	1%

Vegetation Condition:	Poor, disturbed weedy revegetation area
Fauna Evidence:	Wallaby scats
Significant Species:	*n/a*

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 1	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170338	GPS Easting	0300051
GPS Accuracy	+ - 6m	GPS Elevation	95m
Vegetation Community: Western revegetation area			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Ehretia accuminata	U	<5%	*Cenchrus clandestinus*	C	90%
Acacia maidenii	O	15%	*Sida rhombifolia*	C	5%
Geranium homeanum	U	<5%	*Araujia sericifera*	O	5%
Geitonoplesium cymosum	U	<5%	*Chloris gayana*	O	10%
Juncus usitatus	U	<5%	*Phytolacca octandra*	U	<5%
Dichondra repens	U	<5%	Brassica sp.	I	<5%
Oplismenus aemulus	U	<5%	*Lantana camara*	O	5%
Acacia implexa	U	10%	*Ehrharta erecta*	U	<5%
Streblus brunonianus	I	<5%	*Cynodon dactylon*	U	5%
Synoum glandulosum	I	<5%	*Melinis repens*	U	5%
Plectranthus parviflorus	U	<5%	*Verbena bonariensis*	U	5%
			Cirsium vulgare	I	<5%
			Plantago lanceolata	I	<5%
			Bidens pilosa	I	<5%
			Deliria odorata	U	<5%
			Rumex sagittatus	U	<5%
			Cenchrus setaceus	I	1%
			Bromus catharticus	U	<5%

Vegetation Condition:	Poor, disturbed grasses and woody weeds. Turkey Rhubarb is becoming problematic.
Fauna Evidence:	Kangaroo witnessed on and around the site (within the compound)
Significant Species:	*n/a*

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 2	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170345	GPS Easting	0300211
GPS Accuracy	+ - 4m	GPS Elevation	82m
Vegetation Community: Central revegetation area			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Toona ciliata	U	<5%	*Setaria sp.*	O	15%
Acacia maidenii	U	<5%	*Lantana camara*	U	<5%
Geranium homeanum	U	<5%	*Melinis repens*	C	20%
Melaleuca styphelioides	U	<5%	*Senecio madagascariensis*	U	5%
Juncus usitatus	U	<5%	*Cenchrus clandestinus*	C	10%
Dichondra repens	U	<5%	*Bidens pilosa*	C	15%
Oplismenus aemulus	U	<5%	*Gomphocarpus fruticosus*	O	5%
			Sida rhombifolia	C	10%
			Verbena bonariensis	C	5%
			Phytolacca octandra	U	<5%
			Cirsium vulgare	C	10%
			Cenchrus setaceus	C	25%
			Plantago lanceolata	U	<5%
			Brassica sp.	C	45%
			Hypochaeris radicata	O	5%
			Chloris gayana	C	40%
			Sonchus oleraceus	O	<5%
			Lysimachia arvensis	O	5%
			Conyza sumatrensis	O	5%
			Araujia sericifera	0	5%

Vegetation Condition:	Poor, disturbed weedy revegetation area
Fauna Evidence:	Wallaby
Significant Species:	*n/a*

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 2	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170345	GPS Easting	0300211
GPS Accuracy	+ - 4m	GPS Elevation	82m
Vegetation Community: Central revegetation area			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abun**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Toona ciliata	U	<5%	*Setaria sp.*	U	<5%
Acacia maidenii	U	<5%	*Lantana camara*	U	<5%
Geranium homeanum	U	<5%	*Melinis repens*	C	20%
Melaleuca styphelioides	U	<5%	*Cirsium vulgare*	U	<5%
Juncus usitatus	U	<5%	*Cenchrus clandestinus*	C	30%
Dichondra repens	U	<5%	*Bidens pilosa*	U	<5%
Oplismenus aemulus	U	<5%	*Digitaria sanguinalis*	U	<5%
Stephania japonica	U	<5%	*Sida rhombifolia*	C	10%
Melia azedarach	U	<5%	*Vigia sp.*	U	<5%
Aphanopetalum resinosum	U	<5%	*Verbena bonariensis*	U	<5%
Melicytus dentatus	U	<5%	*Trifolium repens*	U	<5%
Glycine sp.	U	<5%	*Cenchrus setaceus*	C	25%
Pandorea pandorana	U	<5%	*Conyza sumatrensis*	O	5%
			Brassica sp.	U	<5%
			Araujia sericifera	C	45%
			Chloris gayana	C	40%
			Sonchus oleraceus		

Vegetation Condition:	Poor, disturbed weedy revegetation area. Ink weed, woody weeds, Turkey Rhubarb and Moth Vine are becoming problematic in this area.
Fauna Evidence:	Wallaby, Top Knot Pigeon
Significant Species:	*n/a*

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 3	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170368	GPS Easting	0300263
GPS Accuracy	+ - 3m	GPS Elevation	84m
Vegetation Community: Eastern edge of revegetation area			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Toona ciliata	U	<5%	*Setaria sp.*	U	<5%
Acacia maidenii	U	<5%	*Senecio madagascariensis*	U	<5%
Geranium homeanum	U	<5%	*Melinis repens*	C	40%
Melaleuca styphelioides	U	<5%	*Conyza sumatrensis*	C	5%
			Plantago lanceolata	C	5%
			Bidens pilosa	C	10%
			Gomphocarpus fruticosus	C	10%
			Sida rhombifolia	C	10%
			Verbena bonariensis	O	<5%
			Modiola caroliniana	C	5%
			Cirsium vulgare	C	5%
			Cenchrus setaceus	O	5%
			Chloris gayana	C	30%
			Brassica sp.	O	<5%
			Aster subulatus	O	<5%

Vegetation Condition:	Poor, disturbed weedy revegetation area
Fauna Evidence:	Wallaby
Significant Species:	*n/a*

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 3	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170368	GPS Easting	0300263
GPS Accuracy	+ - 3m	GPS Elevation	84m
Vegetation Community: Eastern edge of revegetation area			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Toona ciliata	O	10%	*Setaria sp.*	U	<5%
Acacia maidenii	U	<5%	*Senecio madagascariensis*	U	<5%
Geranium homeanum	U	<5%	*Melinis repens*	O	15%
Melaleuca styphelioides	O	10%	*Medicargo sp.*	U	<5%
			Plantago lanceolata	C	10%
			Araujia sericifera	U	10%
			Lantana camara	O	<5%
			Sida rhombifolia	C	10%
			Verbena bonariensis	U	<5%
			Modiola caroliniana	U	<5%
			Cirsium vulgare	C	5%
			Cenchrus setaceus	O	5%
			Chloris gayana	C	70%
			Lysimachia arvensis	U	<5%
			Rumex sagittatus	C	20%
			Tagetes minuta	U	<5%

Vegetation Condition:	Poor, disturbed weedy revegetation area. Ink Weed, Turkey Rhubarb, Moth Vine and Lantana regrowth needs addressing.
Fauna Evidence:	Rouge cattle (brown cow - tagged) spotted outside compound fence.
Significant Species:	*n/a*

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 6.1	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170317	GPS Easting	0300115
GPS Accuracy	+ - 7m	GPS Elevation	90m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Ficus macrophylla	I	45%	*Araujia sericifera*	U	5%
Acacia maidenii	O	20%	*Delairea odorata*	U	5%
Diospyros australis	O	10%	*Solanum pseudocapsicum*	U	5%
Pandorea pandorana	C	10%	*Lantana camara*	C	10%
Streblus brunonianus	C	10%	*Chloris gayana*	U	5%
Elaeodendron australe	O	<5%			
Pittosporum multiflorum	C	<5%			
Alectryon subcinereus	C	<5%			
Notelea venosa	C	<5%			
Croton verreauxii	O	<5%			
Melicytus dentatus	O	<5%			
Alphitonia excelsa	I	10%			
Alchornea ilicifolia	O	<5%			
Geijera salicifolia	I	10%			
Clerodendrum tomentosum	O	<5%			
Eustrephus latifolius	C	<5%			
Nyssanthes erecta	C	<5%			
Maclura cochinchinensis	C	<5%			
Oplismenus imbecillis	C	<5%			
Pseuderanthemum variabile	C	<5%			
Stellaria flaccida	O	<5%			
Geitonoplesium cymosum	O	<5%			
Cayratia clematidea	C	<5%			
Parsonsia straminea	O	<5%			
Asplenium flabellifolium	O	<5%			
Celastrus australis	U	<5%			
Breynia oblongifolia	U	<5%			

Vegetation Condition:	Remnant Dry Rainforest intact canopy with a weedy sub-layer
Fauna Evidence:	n/a
Significant Species:	n/a

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 6.1	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170317	GPS Easting	0300115
GPS Accuracy	+ - 7m	GPS Elevation	90m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abund**	**% Cover**
Ficus macrophylla	I	45%	*Araujia sericifera*	U	5%
Acacia maidenii	O	20%	*Delairea odorata*	U	5%
Diospyros australis	O	10%	*Solanum pseudocapsicum*	U	5%
Pandorea pandorana	C	10%	*Lantana camara*	C	10%
Streblus brunonianus	C	10%	*Chloris gayana*	U	5%
Elaeodendron australe	O	<5%	*Sida rhombifolia*	U	<5%
Pittosporum multiflorum	C	15%			
Alectryon subcinereus	C	<5%			
Notelea venosa	C	<5%			
Croton verreauxii	O	<5%			
Melicytus dentatus	O	<5%			
Alphitonia excelsa	I	10%	**Natives Continued**		
Alchornea ilicifolia	O	<5%	*Cayratia clematidea*	C	<5%
Geijera salicifolia	I	10%	*Parsonsia straminea*	O	<5%
Clerodendrum tomentosum	O	<5%	*Asplenium flabellifolium*	O	<5%
Eustrephus latifolius	C	<5%	*Celastrus australis*	U	<5%
Nyssanthes erecta	C	<5%	*Breynia oblongifolia*	U	<5%
Maclura cochinchinensis	C	<5%	Melicope micrococca	U	<5%
Oplismenus imbecillis	C	<5%	*Geitonoplesium cymosum*	O	<5%
Pseuderanthemum variabile	C	<5%	Dichondra repens	O	5%
Stellaria flaccida	O	<5%	Pellaea falcata	U	<5%

Vegetation Condition:	Remnant Dry Rainforest intact canopy with a weedy sub-layer
Fauna Evidence:	n/a
Significant Species:	n/a

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 6.2	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170330	GPS Easting	0300090
GPS Accuracy	+ - 7m	GPS Elevation	83m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Eucalyptus quadrangulata	I	30%	*Araujia sericifera*	C	10%
Celastrus australis	C	<5%	*Delairea odorata*	C	15%
Notelea venosa	C	<5%	*Solanum pseudocapsicum*	U	<5%
Streblus brunonianus	C	10%	*Anredera cordifolia*	U	<5%
Alchornea ilicifolia	C	<5%	*Lantana camara*	C	70%
Nyssanthes erecta	C	<5%	*Chloris gayana*	U	<5%
Analiema biflorum	U	<5%	*Solanum linnaeanum*	1	5%
Alphitonia excelsa	O	<5%	*Phytolacca octandra*	U	<5%
Elaeodendron australe	C	<5%	*Cirsium vulgare*	U	<5%
Croton verreauxii	O	<5%	*Phyllanthus tenellus*	U	<5%
Geitonoplesium cymosum	C	<5%	*Solanum mauritianum*	U	5%
Clerodendrum tomentosum	C	<5%			
Trophis scandens	O	<5%			
Pittosporum undulatum	O	<5%			
Pandorea pandorana	O	10%			
Asplenium flabellifolium	O	<5%			
Acacia maidenii	U	<5%			
Eustrephus latifolius	C	<5%			
Dichondra repens	C	<5%			
Pseuderanthemum variabile	C	<5%			
Commelina cyanea	C	<5%			
Glycine sp.	C	<5%			
Maclura cochinchinensis	I	<5%			
Melicope micrococca	I	<5%			

Vegetation Condition:	Intact canopy, weedy shrub layer
Fauna Evidence:	n/a
Significant Species:	n/a

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 6.2	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170330	GPS Easting	0300090
GPS Accuracy	+ - 7m	GPS Elevation	83m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abund**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Eucalyptus quadrangulata	I	30%	*Araujia sericifera*	C	15%
Celastrus australis	C	15%	*Delairea odorata*	C	15%
Notelea venosa	C	<5%	*Solanum pseudocapsicum*	U	<5%
Streblus brunonianus	C	<5%	Sida rhombifolia	I	<5%
Alchornea ilicifolia	C	<5%	*Lantana camara*	C	50%
Nyssanthes erecta	C	<5%	*Chloris gayana*	U	<5%
Analiema biflorum	U	<5%	*Solanum linnaeanum*	1	5%
Alphitonia excelsa	O	<5%	*Phytolacca octandra*	U	<5%
Elaeodendron australe	C	<5%	*Cirsium vulgare*	U	<5%
Croton verreauxii	O	<5%	*Phyllanthus tenellus*	U	<5%
Geitonoplesium cymosum	C	<5%	*Solanum mauritianum*	U	5%
Clerodendrum tomentosum	C	<5%	Solanum nigrum	I	<5%
Trophis scandens	O	<5%			
Pittosporum undulatum	O	<5%			
Pandorea pandorana	O	10%	**Natives Continued**		
Asplenium flabellifolium	O	<5%	Asplenium flabellifolium	O	10%
Acacia maidenii	U	<5%	Stellaria flaccida	U	<5%
Eustrephus latifolius	C	<5%	Dioperous australia	I	5%
Dichondra repens	C	<5%	Alectryon subcinereus	I	5%
Pseuderanthemum variabile	C	<5%	Plectrantus parv	O	5%
Commelina cyanea	C	<5%	Pandorea pandorana	C	40%
Glycine sp.	C	<5%	Oplismenus sp.	U	<5%
Maclura cochinchinensis	I	<5%	Dichondra repens	U	<5%
Melicope micrococca	I	<5%			

Vegetation Condition:	Intact canopy, weedy shrub layer
Fauna Evidence:	Top Knot Pigeons, Grey Fantail
Significant Species:	n/a

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 8.1	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170280	GPS Easting	0300422
GPS Accuracy	+ - 7m	GPS Elevation	74m
Vegetation Community: Illawarra Subtropical Rainforest Eco-tone			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abund**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Acacia maidenii	U	<5%	*Olea europaea*	U	10%
Guioa semiglauca	U	<5%	*Lantana camara*	C	20%
Alphitonia excelsa	O	10%	*Bidens Pilosa*	O	<5%
Notelea venosa	U	10%	*Sida rhombifolia*	O	<5%
Hibiscus heterophyllus	C	10%	*Tagetes minuta*	O	5%
Pittosporum undulatum	C	15%	*Delairea odorata*	O	5%
Clerodendrum tomentosum	I	<5%	*Solanum mauritianum*	U	<5%
Diospyros pentamera	I	<5%	*Chloris gayana*	C	10%
Streblus brunonianus	C	<5%	*Senecio madagascariensis*	O	<5%
Pandorea pandorana	C	25%			
Adiantum formosum	C	30%			
Oplismenus aemulus	C	15%			
Pellaea falcata	C	<5%			
Geitonoplesium cymosum	C	<5%			
Abutilon oxycarpum	C	15%			
Dichondra repens	C	<5%			
Poa labillardieri	O	<5%			
Breynia oblongifolia	O	<5%			
Glycine sp.	U	<5%			
Geijera salicifolia	U	10%			
Maclura cochinchinensis	O	<5%			
Pseuderanthemum variabile	O	<5%			
Melicope micrococca	I	<5%			
Parsonsia straminea	I	<5%			
Plectranthus parviflorus	O	<5%			
Eustrephus latifolius	O	<5%			
Claoxylon australe	I	<5%			

Vegetation Condition:	Intact canopy with a disturbed understorey
Fauna Evidence:	Wallaby and cattle
Significant Species:	n/a

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 8.1	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170280	GPS Easting	0300422
GPS Accuracy	+ - 7m	GPS Elevation	74m
Vegetation Community: Illawarra Subtropical Rainforest Eco-tone			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abund**	**% Cover**	**Botanical Name Weed Sp.**	**Abun**	**% Cover**
Acacia maidenii	U	<5%	*Olea europaea*	U	10%
Guioa semiglauca	U	<5%	*Lantana camara*	C	20%
Alphitonia excelsa	O	10%	*Bidens Pilosa*	O	<5%
Notelea venosa	U	10%	*Sida rhombifolia*	O	<5%
Hibiscus heterophyllus	C	10%	*Araujia sericifera*	I	<5%
Pittosporum undulatum	C	15%	*Delairea odorata*	O	5%
Clerodendrum tomentosum	I	<5%	*Solanum mauritianum*	U	<5%
Diospyros pentamera	I	<5%	*Chloris gayana*	C	10%
Streblus brunonianus	C	<5%	*Senecio madagascariensis*	O	<5%
Pandorea pandorana	C	25%			
Adiantum formosum	C	30%			
Oplismenus aemulus	C	15%			
Pellaea falcata	C	<5%	**Natives Continued**		
Geitonoplesium cymosum	C	<5%	*Parsonsia straminea*	I	<5%
Pseuderanthemum variabile	O	<5%	*Plectranthus parviflorus*	O	<5%
Dichondra repens	C	<5%	*Eustrephus latifolius*	O	<5%
Melicope micrococca	I	<5%	*Claoxylon australe*	I	<5%
Breynia oblongifolia	O	<5%	*Asplenium flabellifolium*	O	<5%
Glycine sp.	U	<5%	*Trophis scandens*	U	<5%
Geijera salicifolia	U	10%	*Eustrephus lat*	U	<5%
Maclura cochinchinensis	O	<5%	*Cynodon dactylon*	O	5%

Vegetation Condition:	Intact canopy with a disturbed understorey.
Fauna Evidence:	Wallaby and cattle (fresh scat), Superb Fairy Wrens
Significant Species:	n/a

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 8.2	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170284	GPS Easting	0300379
GPS Accuracy	+ - 7m	GPS Elevation	60m
Vegetation Community: Illawarra Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Daphnandra johnsonii	U	10%	*Anredera cordifolia*	C	30%
Dendrocnide excelsa	C	25%	*Lantana camara*	U	<5%
Ehretia accuminata	I	10%	*Delairea odorata*	U	<5%
Baloghia inophylla	C	7%	*Solanum mauritianum*	O	<5%
Pittosporum undulatum	C	7%			
Alectryon subcinereus	C	<5%			
Elaeodendron australe	C	<5%			
Diploglottis australis	I	<5%			
Pararchidendron pruinosum	O	10%			
Brachychiton acerifolius	I	<5%			
Notelaea venosa	C	10%			
Streblus brunonianus	C	10%			
Marsdenia flavescens	C	<5%	**Natives Continued**		
Alphitonia excelsa	C	<5%	*Palmeria scandens*	I	<5%
Guioa semiglauca	O	<5%	*Marsdenia rostrata*	O	<5%
Gymnostachys anceps	U	<5%	*Eustrephus latifolius*	U	<5%
Adiantum aethiopicum	C	10%	*Cinnamomum oliveri*	I	<5%
Arthropteris tenella	U	<5%	*Claoxylon australe*	U	<5%
Doodia aspera	U	<5%	*Wilkiea huegeliana*	U	<5%
Parsonsia straminea	U	<5%			
Croton verreauxii	I	<5%			
Pseuderanthemum variabile	U	<5%			
Pandorea pandorana	U	<5%			
Microsorum scandens	U	<5%			
Trophis scandens	O	<5%			
Livistona australis	I	<5%			
Melictyus dentataus	I	<5%			

Vegetation Condition:	Remnant Subtropical Rainforest with intact canopy
Fauna Evidence:	Animal tracks
Significant Species:	*Daphnandra johnsonii* Illawarra endemic threatened species

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 8.2	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170284	GPS Easting	0300379
GPS Accuracy	+ - 7m	GPS Elevation	60m
Vegetation Community: Illawarra Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abund**	**% Cover**	**Botanical Name Weed Sp.**	**Abund**	**% Cover**
Daphnandra johnsonii	U	10%	*Anredera cordifolia*	C	30%
Dendrocnide excelsa	C	25%	*Lantana camara*	U	<5%
Ehretia accuminata	I	10%	*Delairea odorata*	U	<5%
Baloghia inophylla	C	7%	*Solanum mauritianum*	O	<5%
Pittosporum undulatum	C	7%			
Alectryon subcinereus	C	<5%			
Elaeodendron australe	C	<5%			
Diploglottis australis	I	<5%	**Natives Continued**		
Pararchidendron pruinosum	O	10%	*Palmeria scandens*	I	<5%
Brachychiton acerifolius	I	<5%	*Marsdenia rostrata*	O	<5%
Notelaea venosa	C	10%	*Eustrephus latifolius*	U	<5%
Streblus brunonianus	C	10%	*Cinnamomum oliveri*	I	<5%
Marsdenia flavescens	C	<5%	*Claoxylon australe*	U	<5%
Alphitonia excelsa	C	<5%	*Wilkiea huegeliana*	U	<5%
Guioa semiglauca	O	<5%	*Diploglottis australis*	I	<5%
Gymnostachys anceps	U	<5%	*Pseuderanthemum variabile*	U	<5%
Adiantum aethiopicum	C	10%	*Pandorea pandorana*	U	<5%
Arthropteris tenella	U	<5%	*Microsorum scandens*	U	<5%
Doodia aspera	U	<5%	*Trophis scandens*	O	<5%
Parsonsia straminea	U	<5%	*Livistona australis*	I	<5%
Croton verreauxii	I	<5%	*Melictyus dentataus*	I	<5%

Vegetation Condition:	Remnant Subtropical Rainforest with intact canopy
Fauna Evidence:	Animal tracks and cow scat, Top Knot Pigeons
Significant Species:	*Daphnandra johnsonii* Illawarra endemic threatened species

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 8.3	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170385	GPS Easting	0300387
GPS Accuracy	+ - 6m	GPS Elevation	84m
Vegetation Community: Disturbed grassy woodland – Red Gum Forest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Eucalyptus tereticornis	C	40%	*Lantana camara*	C	25%
Acacia maidenii	U	10%	*Tagetes minuta*	C	7%
Pittosporum undulatum	U	<5%	*Bidens Pilosa*	C	5%
Maclura cochinchinensis	U	<5%	*Verbena bonariensis*	O	5%
Dichondra repens	U	<5%	*Sida rhombifolia*	C	5%
Glycine sp.	U	<5%	*Plantago lanceolata*	U	<5%
Pandorea pandorana	O	<5%	*Chloris gayana*	C	15%
Breynia oblongifolia	O	<5%	*Cenchrus clandestinus*	C	10%
Geitonoplesium cymosum	O	<5%	Conyza sumatrensis	O	5%
Notelea venosa	U	<5%	*Araujia sericifera*	O	5%
Carex longebrachiata	C	<5%	*Senecio madagascariensis*	O	5%
			Cirsium vulgare	O	5%

Vegetation Condition:	Intact canopy, poor weed infested understorey
Fauna Evidence:	Grazing animals – cattle
Significant Species:	*n/a*

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 8.3	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170385	GPS Easting	0300387
GPS Accuracy	+ - 6m	GPS Elevation	84m
Vegetation Community: Disturbed grassy woodland – Red Gum Forest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Eucalyptus tereticornis	C	40%	*Lantana camara*	U	<5%
Acacia maidenii	U	10%	*Tagetes minuta*	C	20%
Pittosporum undulatum	U	<5%	*Bidens Pilosa*	C	5%
Maclura cochinchinensis	U	<5%	*Verbena bonariensis*	U	<5%
Dichondra repens	U	<5%	*Sida rhombifolia*	C	15%
Glycine sp.	U	<5%	*Plantago lanceolata*	U	<5%
Pandorea pandorana	O	<5%	*Chloris gayana*	I	<5%
Breynia oblongifolia	O	<5%	*Cenchrus clandestinus*	C	10%
Geitonoplesium cymosum	O	<5%	*Passiflora subpeltata*	U	5%
Notelea venosa	U	<5%	*Araujia sericifera*	O	5%
Carex longebrachiata	C	<5%	*Senecio madagascariensis*	O	10%
Geranium homeanum	C	10%	*Cirsium vulgare*	O	5%
Oplismenus aemulus	C	10%			
Oplismenus imbecillis	C	10%			
Dichondra repens	C	5%			
Glycine tabacina	U	<5%			
Hibiscus heterophyllus	I	<5%			
Glycine clandest	U	<5%			

Vegetation Condition:	Intact canopy, poor weed infested understorey. Lantana processed and treated within the past year has allowed for a succession of native and weedy groundcovers and grasses.
Fauna Evidence:	Carex grazed, fresh cow scat and tracks within site.
Significant Species:	*n/a*

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 9	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170272	GPS Easting	0300442
GPS Accuracy	+ - 5m	GPS Elevation	100m
Vegetation Community: Disturbed open grassland between rainforest remnants. Eco-tone			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Acacia maidenii	O	15%	*Lantana camara*	C	20%
Pittosporum undulatum	U	10%	*Chloris gayana*	C	70%
Guioa semiglauca	O	<5%	*Bidens Pilosa*	C	20%
Pandorea pandorana	O	<5%	*Sida rhombifolia*	O	<5%
Maclura cochinchinensis	O	<5%	*Delairea odorata*	O	5%
Dichondra repens	I	<5%	*Verbena bonariensis*	U	<5%
Carex longebrachiata	C	<5%	*Senecio madagascariensis*	O	<5%
Breynia oblongifolia	I	<5%	*Araujia sericifera*	U	<5%
Hibiscus heterophyllus	I	<5%	*Solanum pseudocapsicum*	O	<5%
			Cirsium vulgare	O	<5%
			Conyza sumatrensis	U	<5%
			Plantago lanceolata	O	<5%
			Cenchrus clandestinus	O	5%
			Gomphocarpus fruticosus	O	<5%

Vegetation Condition:	Disturbed open grassland. Heavily weed infested, no canopy
Fauna Evidence:	Wallaby
Significant Species:	*n/a*

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 9	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170272	GPS Easting	0300442
GPS Accuracy	+ - 5m	GPS Elevation	100m
Vegetation Community: Disturbed open grassland between rainforest remnants. Eco-tone			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Acacia maidenii	O	15%	*Lantana camara*	C	20%
Pittosporum undulatum	U	10%	*Chloris gayana*	C	70%
Guioa semiglauca	O	<5%	*Bidens Pilosa*	U	10%
Pandorea pandorana	O	<5%	*Sida rhombifolia*	O	<5%
Maclura cochinchinensis	O	<5%	*Delairea odorata*	O	5%
Dichondra repens	I	<5%	*Verbena bonariensis*	U	<5%
Carex longebrachiata	C	<5%	*Senecio madagascariensis*	O	<5%
Breynia oblongifolia	I	<5%	*Araujia sericifera*	U	<5%
Hibiscus heterophyllus	I	<5%	*Solanum pseudocapsicum*	O	5%
Glycine caland	U	<5%	*Cirsium vulgare*	O	<5%
Adiantum aetheopicus	U	<5%	*Verbena rigida*	U	<5%
Oplismenus sp.	O	5%	*Plantago lanceolata*	O	<5%
Geitonoplesium cymosum	I	<5%	Cenchrus clandestinus	O	5%
Geranium homeanum	U	<5%	*Delaria odorata*	U	<5%

Vegetation Condition:	Disturbed open grassland. Heavily weed infested, no canopy
Fauna Evidence:	Clear grazing area of wombat, burrow nearby with fresh turned soil and clear tracks.
Significant Species:	*n/a*

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 10.1	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170437	GPS Easting	0300428
GPS Accuracy	+ - 8m	GPS Elevation	97m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abun**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Acacia maidenii	I	<5%	*Araujia sericifera*	O	<5%
Guioa semiglauca	C	20%	*Bidens pilosa*	U	<5%
Maclura cochinchinensis	C	25%	*Lantana camara*	C	20%
Hibiscus heterophyllus	C	<5%	*Delairea odorata*	C	20%
Pittosporum undulatum	C	10%	*Oxalis sp.*	C	<5%
Elaeodendron australe	C	10%	*Solanum pseudocapsicum*	U	<5%
Streblus brunonianus	C	<5%	*Sida rhombifolia*	O	5%
Pandorea pandorana	C		*Senecio madagascariensis*	U	<5%
Diploglottis australis	I	<5%	*Olea europaea*	O	<5%
Pellaea falcata	O	<5%	*Senecio madagascariensis*	U	<5%
Asplenium flabellifolium	O	<5%	*Tagetes minuta*	U	<5%
Aphanopetalum resinosum	C	10%	*Solanum mauritianum*	U	<5%
Cissus antarctica	O	10%	*Sonchus oleraceus*	U	<5%
Notelea venosa	U	10%	*Phytolacca octandra*	O	5%
Clerodendrum tomentosum	O	<5%	*Cirsium vulgare*	U	<5%
Eustrephus latifolius	C	<5%	*Conyza sumatrensis*	U	<5%
Oplismenus aemulus	O	<5%	*Solanum linnaeanum*	I	1%
Plectranthus parviflorus	O	<5%	*Verbena sp.*	O	5%
Trophis scandens	O	<5%	*Physalis peruviana*	U	<5%
Cayratia clematidea	U	<5%			
Solanum opacum	I	<5%			
Alchornea ilicifolia	I	<5%			
Nyssanthes erecta	U	<5%			
Einadia hastata	U	<5%			
Microlaena stipoides	I	<5%			
Geranium homeanum	U	<5%			
Adiantum aethiopicum	U	<5%			

Vegetation Condition:	Intact canopy, poor understory
Fauna Evidence:	Wallaby scats
Significant Species:	n/a

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 10.1	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170437	GPS Easting	0300428
GPS Accuracy	+ - 8m	GPS Elevation	97m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abund**	**% Cover**
Acacia maidenii	I	<5%	*Araujia sericifera*	O	<5%
Guioa semiglauca	C	20%	*Bidens pilosa*	U	<5%
Maclura cochinchinensis	C	25%	*Lantana camara*	C	20%
Hibiscus heterophyllus	C	10%	*Delairea odorata*	C	20%
Pittosporum undulatum	C	10%	*Oxalis sp.*	C	<5%
Elaeodendron australe	C	10%	*Solanum pseudocapsicum*	U	<5%
Streblus brunonianus	C	<5%	*Sida rhombifolia*	O	5%
Pandorea pandorana	C	<5%	*Senecio madagascariensis*	U	<5%
Diploglottis australis	I	<5%	*Olea europaea*	O	<5%
Pellaea falcata	U	<5%	*Physalis peruviana*	U	10%
Asplenium flabellifolium	O	<5%	*Tagetes minuta*	U	<5%
Aphanopetalum resinosum	C	10%	*Solanum mauritianum*	U	<5%
Cissus antarctica	O	10%	*Solanum linnaeanum*	I	1%
Notelea venosa	U	10%	*Verbena sp.*	O	5%
Clerodendrum tomentosum	O	<5%			
Eustrephus latifolius	C	<5%			
Oplismenus aemulus	O	<5%	**Natives Continued**		
Plectranthus parviflorus	O	<5%	*Einadia hastata*	U	<5%
Trophis scandens	O	<5%	*Microlaena stipoides*	I	<5%
Cayratia clematidea	U	<5%	*Geranium homeanum*	U	<5%
Solanum opacum	I	<5%	*Adiantum aethiopicum*	U	<5%
Alchornea ilicifolia	I	<5%	*Lagnophera mooreii*	U	<5%
Nyssanthes erecta	U	<5%	Dichondra repens	C	<5%
Pseuderanthemum variabile	U	<5%			

Vegetation Condition:	Intact canopy, poor understory
Fauna Evidence:	Wallaby scats
Significant Species:	n/a

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 10.2	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170385	GPS Easting	0300432
GPS Accuracy	+ - 11m	GPS Elevation	100m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abun**	**% Cover**
Clerodendrum tomentosum	O	<5%	*Araujia sericifera*	C	5%
Gymnostachys anceps	I	<5%	*Solanum mauritianum*	U	<5%
Elaeodendron australe	O	15%	*Lantana camara*	U	5%
Streblus brunonianus	O	20%	*Delairea odorata*	O	10%
Cayratia clematidea	O	10%	*Passiflora subpeltata*	O	5%
Oplismenus imbecillis	O	<5%	*Solanum pseudocapsicum*	O	<5%
Trophis scandens	O	10%	*Sida rhombifolia*	U	<5%
Eustrephus latifolius	C	<5%			
Aphanopetalum resinosum	C	15%			
Guioa semiglauca	C	10%			
Pittosporum revolutum	I	<5%			
Notelea venosa	C	20%			
Pandorea pandorana	C	10%			
Alphitonia excelsa	C	10%	**Natives Continued**		
Pellaea falcata	U	<5%	*Diospyros australis*	I	<5%
Melicytus dentatus	I	<5%	*Hibiscus heterophyllus*	O	<5%
Parsonsia straminea	C	15%	*Baloghia inophylla*	I	<5%
Geitonoplesium cymosum	C	<5%	*Pseuderanthemum variabile*	C	<5%
Polyscias elegans	I	<5%	*Stephania japonica*	I	<5%
Alchornea ilicifolia	U	<5%	*Acacia maidenii*	U	<5%
Maclura cochinchinensis	C	10%	*Tylophora barbata*	U	<5%
Marsdenia rostrata	C	10%	*Abutilon oxycarpum*	I	<5%
Melicope micrococca	I	<5%			
Alectryon subcinereus	U	<5%			
Pittosporum undulatum	C	<5%			
Cryptocarya microneura	I	<5%			

Vegetation Condition:	Intact canopy with a poor understory
Fauna Evidence:	Wallaby
Significant Species:	n/a

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 10.2	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170385	GPS Easting	0300432
GPS Accuracy	+ - 11m	GPS Elevation	100m
Vegetation Community: Illawarra Dry Subtropical Rainforest			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site

Botanical Name Native Sp.	**Abund**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Clerodendrum tomentosum	O	<5%	*Araujia sericifera*	C	15%
Gymnostachys anceps	I	<5%	*Solanum mauritianum*	U	<5%
Elaeodendron australe	O	15%	*Lantana camara*	U	<5%
Streblus brunonianus	O	20%	*Delairea odorata*	U	5%
Cayratia clematidea	O	10%	*Passiflora subpeltata*	O	5%
Oplismenus imbecillis	O	<5%	*Solanum pseudocapsicum*	O	<5%
Trophis scandens	O	10%	*Sida rhombifolia*	U	<5%
Eustrephus latifolius	C	<5%			
Aphanopetalum resinosum	C	15%			
Guioa semiglauca	C	10%			
Pittosporum revolutum	I	<5%	**Natives Continued**		
Notelea venosa	C	20%	*Diospyros australis*	I	<5%
Pandorea pandorana	C	10%	*Hibiscus heterophyllus*	O	<5%
Alphitonia excelsa	C	10%	*Baloghia inophylla*	I	<5%
Pellaea falcata	U	<5%	*Pseuderanthemum variabile*	C	<5%
Melicytus dentatus	I	<5%	*Stephania japonica*	I	<5%
Parsonsia straminea	C	15%	*Acacia maidenii*	U	<5%
Geitonoplesium cymosum	C	<5%	*Tylophora barbata*	U	<5%
Polyscias elegans	I	<5%	*Abutilon oxycarpum*	I	<5%
Alchornea ilicifolia	U	<5%	Dendrocnide excelsa	U	<5%
Maclura cochinchinensis	C	10%	Parsonsia strumena	U	<5%
Marsdenia rostrata	C	10%	Stephania japonica	U	<5%
Melicope micrococca	I	<5%	*Asplenium flabellifolium*	O	<5%
Alectryon subcinereus	U	<5%	*Cryptocarya microneura*	I	<5%
Pittosporum undulatum	C	<5%			

Vegetation Condition:	Intact canopy with a poor understory
Fauna Evidence:	Much Bird Life
Significant Species:	n/a

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 4	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170430	GPS Easting	0300388
GPS Accuracy	+ - 6m	GPS Elevation	106m
Vegetation Community: Revegetation Zone adjacent to Red Gum Woodland			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site
P	Planted	Installed during revegetation

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Melaleuca styphelioides	P	1%	*Cenchrus clandestinus*	C	15%
Acacia maidenii	I	1%	*Sida rhombifolia*	C	<5%
Eucalyptus amplifolia	P	1%	*Araujia sericifera*	O	<5%
Pandorea pandorana	I	1%	*Chloris gayana*	C	80%
Eucalyptus tereticornis	I	1%	*Cirsium vulgare*	O	<5%
Eucalyptus quadrangulata	P	1%	*Senecio madagascariensis*	O	<5%
Podocarpus elatus	P	1%	*Bidens pilosa*	C	<5%
Acacia implexa	P	1%	*Verbena bonariensis*	O	<5%
Diospyros australis	P	1%	*Sonchus oleraceus*	O	<5%
Diploglottis australis	P	1%	*Sonchus asper*	I	1%
Ficus coronata	P	1%	*Conyza sumatrensis*	U	5%
Ficus henneana	P	1%			
Homalanthus populifolius	P	1%			
Acmena smithii	P	1%			
Glochidion ferdinandi	P	1%			
Carex longebrachiata	P	1%			
Myrsine variabilis	P	1%			

Vegetation Condition:	Recent revegetation area
Fauna Evidence:	Eastern Grey Kangaroo, Fox scats
Significant Species:	*n/a*

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 4	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170430	GPS Easting	0300388
GPS Accuracy	+ - 6m	GPS Elevation	106m
Vegetation Community: Revegetation Zone adjacent to Red Gum Woodland			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site
P	Planted	Installed during revegetation

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abund**	**% Cover**
Melaleuca styphelioides	P	1%	*Cenchrus clandestinus*	C	15%
Acacia maidenii	I	1%	*Sida rhombifolia*	C	<5%
Eucalyptus amplifolia	P	1%	*Araujia sericifera*	O	<5%
Pandorea pandorana	I	1%	*Chloris gayana*	C	80%
Eucalyptus tereticornis	I	1%	*Cirsium vulgare*	O	<5%
Eucalyptus quadrangulata	P	1%	*Senecio madagascariensis*	O	<5%
Podocarpus elatus	P	1%	*Bidens pilosa*	C	<5%
Acacia implexa	P	1%	*Verbena bonariensis*	O	<5%
Diospyros australis	P	1%	*Sonchus oleraceus*	O	<5%
Diploglottis australis	P	1%	*Sonchus asper*	I	1%
Ficus coronata	P	1%	*Conyza sumatrensis*	U	5%
Ficus henneana	P	1%			
Homalanthus populifolius	P	1%			
Acmena smithii	P	1%			
Glochidion ferdinandi	P	1%			
Carex longebrachiata	P	1%			
Myrsine variabilis	P	1%			

Vegetation Condition:	Revegetation area, continued maintenance and great threat of smothering by Kikuyu.
Fauna Evidence:	Eastern Grey Kangaroo, Black Shouldered Kites x2 over site.
Significant Species:	*n/a*

Previous Year (2021)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 23/06/2021		Plot No: 5	
Recorder: Marcus and Billie		Plot Size: 20 x 20m	
GPS Northing	6170435	GPS Easting	0300466
GPS Accuracy	+ - 7m	GPS Elevation	115m
Vegetation Community: Revegetation Zone with Dry Rainforest pocket			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site
P	Planted	Installed during revegetation

Botanical Name Native Sp.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Pandorea pandorana	C	35%	*Cenchrus clandestinus*	C	5%
Pittosporum undulatum	U	5%	*Sida rhombifolia*	C	5%
Carex longebrachiata	O	8%	*Araujia sericifera*	U	<5%
Maclura cochinchinensis	U	20%	*Chloris gayana*	O	<5%
Plectranthus parviflorus	U	<5%	*Cirsium vulgare*	U	<5%
Cheilanthes austrotenuifolia	U	<5%	*Senecio madagascariensis*	O	5%
Alchornea ilicifolia	O	15%	*Bidens pilosa*	O	<5%
Acacia implexa	I	<5%	*Rumex sagittatus*	I	1%
Diospyros australis	U	5%	*Phyllanthus tenellus*	I	1%
Geitonoplesium cymosum	C	10%	*Olea europaea subsp. cuspidata*	U	5%
Scolopia braunii	C	60%	*Conyza sumatrensis*	U	<5%
Oplismenus sp.	C	40%	*Lantana camara*	U	<5%
Melia azedarach	I	1%	Delairea odorata	O	5%
Croton verreauxii	U	<5%	*Solanum pseudocapsicum*	U	<5%
Aphanopetalum resinosum	O	15%	*Gomphocarpus fruticosus*	U	<5%
Gymnostachys anceps	I	1%			
Myrsine variabilis	U	<5%	**Native Continued**		
Pittosporum multiflorum	U	<5%	*Streblus brunonianus*	O	10%
Notelaea venosa	O	10%	*Elaeodendron australe*	U	<5%
Alectryon subcinereus	U	5%	*Stenocarpus salignus*	U	<5%
Guioa semiglauca	U	8%	*Cynanchum elegans*	I	1%
Alphitonia excelsa	U	<5%	*Parsonsia straminea*	O	8%
Claoxylon australe	I	1%	*Clerodendrum tomentosum*	U	<5%

Vegetation Condition:	Recent revegetation area/ dry rainforest in good condition
Fauna Evidence:	n/a
Significant Species:	*Cynanchum elegans*

This Year (2022)

Good Bush Monitoring Survey sheet		Site: Cleary Bros Albion Park Quarry	
Date: 08/06/2022		Plot No: 5	
Recorder: Marcus and Tanita		Plot Size: 20 x 20m	
GPS Northing	6170435	GPS Easting	0300466
GPS Accuracy	+ - 7m	GPS Elevation	115m
Vegetation Community: Revegetation Zone with Dry Rainforest pocket			

Abundance Key

I	Isolated specimens	Usually only 1 individual plant
U	Uncommon	2 to 10 plants throughout the site
O	Occasional	10 to 50 plants throughout the site
C	Common	50 + plants throughout the site
P	Planted	Installed during revegetation

Botanical Name Native Sp.	**Abund**	**% Cover**	**Botanical Name Weed Sp.**	**Abund**	**% Cover**
Pandorea pandorana	C	35%	*Cenchrus clandestinus*	C	5%
Pittosporum undulatum	U	5%	*Sida rhombifolia*	C	5%
Carex longebrachiata	O	8%	*Araujia sericifera*	U	<5%
Maclura cochinchinensis	U	20%	*Chloris gayana*	O	<5%
Plectranthus parviflorus	U	<5%	*Cirsium vulgare*	U	<5%
Cheilanthes austrotenuifolia	U	<5%	*Senecio madagascariensis*	O	5%
Alchornea ilicifolia	O	15%	*Bidens pilosa*	O	<5%
Acacia implexa	I	<5%	*Rumex sagittatus*	I	1%
Diospyros australis	U	5%	*Phyllanthus tenellus*	I	1%
Geitonoplesium cymosum	C	10%	*Olea europaea*	U	5%
Scolopia braunii	C	60%	*Conyza sumatrensis*	U	<5%
Oplismenus sp.	C	40%	*Lantana camara*	U	<5%
Melia azedarach	I	1%	Delairea odorata	O	5%
Croton verreauxii	U	<5%	*Solanum pseudocapsicum*	U	<5%
Aphanopetalum resinosum	O	15%	*Gomphocarpus fruticosus*	U	<5%
Gymnostachys anceps	I	1%	*Verbena bonariensis*	U	<5%
Myrsine variabilis	U	<5%	*Ehrharta erecta*	C	10%
Pittosporum multiflorum	U	<5%			
Notelaea venosa	O	10%			
Alectryon subcinereus	U	5%	**Native Continued**		
Guioa semiglauca	U	8%	*Parsonsia straminea*	O	8%
Alphitonia excelsa	U	<5%	*Clerodendrum tomentosum*	U	<5%
Claoxylon australe	I	1%	*Breynia oblongifolia*	O	<5%
Pitto multi	C	5%	*Clerodendrum tomentosum*	U	<5%
Geranium homeanum	C	<5%	*Stenocarpus salignus*	U	5%
Asplenium flabellifolium	C	<5%	*Hibiscus heterophyllus*	O	5%
Dichondra repens	C	<5%	*Stenocarpus salignus*	U	<5%
Glycine clandestinus	O	<5%	*Streblus brunonianus*	O	10%
Acacia maidenii	O	5%	*Elaeodendron australe*	U	<5%

Vegetation Condition:	Recent revegetation area/ dry rainforest in good condition
Fauna Evidence:	n/a

Significant Species:	*Cynanchum elegans* no longer present on site, found nearby (coordinated **91 E 300418 N 6170411**)

References

Cleary Bros (Bombo) (2018). Vegetation Management Plan, Albion Park Hard Rock Quarry. The Company, Port Kembla.

Kevin Mills & Associates (2007). Vegetation Management Plan, Albion Park Hard Rock Quarry, Cleary Bros (Bombo) Pty Limited. Cleary Bros (Bombo), Port Kembla, October.

Annexure E

Environmental Monitoring Results from the 2021-2022 Reporting Period

Groundwater Monitoring Results

	MW 1D				MW 1S			
	Sep-21	Dec-21	Apr-22	Jun-22	Sep-21	Dec-21	Apr-22	Jun-22
pH (pH units)	7.2	7.3	7.3	7	6.6	6.6	6.6	6.4
Conductivity (µS/cm)	1680	1650	1580	836	939	910	671	687
TDS (mg/L)	1210	1030	1090	500	656	558	473	482
TSS (mg/L)	199	359	170	210	175	26	100	41
Temperature (°C)	21.5	19.2	18.4	16.3	21.1	17.5	18.9	16.4
Alkalinity (mg/L)	306	271	257	196	98	135	126	159
Sulphate (mg/L)	477	489	443	171	290	274	167	141
Chloride (mg/L)	85	84	80	34	41	37	22	31
Calcium (mg/L)	153	141	143	64	41	39	32	33
Sodium (mg/L)	261	264	222	106	124	121	86	81
Potassium (mg/L)	<1	3	<1	2	2	2	4	2
Dissolved Arsenic (mg/L)	0.002	0.001	0.001	NT	NT	NT	NT	NT
Dissolved Cadmium (mg/L)	<0.0001	<0.0001	<0.0001	NT	NT	NT	NT	NT
Dissolved Chromium (mg/L)	<0.001	<0.001	<0.001	NT	NT	NT	NT	NT
Dissolved Copper (mg/L)	<0.001	<0.001	0.002	<0.001	0.03	0.021	0.018	0.032
Dissolved Iron (mg/L)	0.14	0.16	<0.05	<0.05	<0.05	<0.05	0.1	0.29
Dissolved Lead (mg/L)	<0.001	<0.001	<0.001	NT	NT	NT	NT	NT
Dissolved Mercury (mg/L)	<0.0001	<0.0001	<0.0001	NT	NT	NT	NT	NT
Dissolved Nickel (mg/L)	0.006	0.004	0.006	0.004	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc (mg/L)	0.037	0.087	0.048	0.035	0.045	0.008	0.059	0.057
Ammonia (mg/L)	0.1	0.08	0.02	0.62	<0.01	0.03	0.06	0.02
Nitrate (mg/L)	1.99	2.55	2.71	2.43	1.25	0.82	0.25	0.25
TKN (mg/L)	0.7	2.1	1.2	2.2	0.7	1.8	2.6	1.6
Total Phosphorus (mg/L)	0.19	0.51	0.24	0.48	0.16	0.11	0.33	0.21
TOC (mg/L)	10	6	4	6	14	17	24	20
Oil & Grease (mg/L)	<5	<5	<5	<5	<5	<5	<5	<5
BOD (mg/L)	<2	<2	<2	2	<2	<2	2	<2
Depth (mbgl)	20.7	20	21.9	17.3	3.72	2.75	1	2.59
NT = Not Tested								

	MW 2D				MW 2S			
	Sep-21	Dec-21	Apr-22	Jun-22	Sep-21	Dec-21	Apr-22	Jun-22
pH (pH units)	7.3	7.3	7.3	7.3	7	6.7	6.5	7
Conductivity (µS/cm)	1790	1780	1750	1760	1170	964	940	1120
TDS (mg/L)	1250	1040	1150	1140	972	654	711	746
TSS (mg/L)	41	28	14	79	762	63	96	67
Temperature (°C)	19	20	18	16	20.7	18.1	18.5	15.7
Alkalinity (mg/L)	322	320	298	292	331	212	169	256
Sulphate (mg/L)	189	236	210	230	221	234	225	252
Chloride (mg/L)	301	300	275	287	54	44	59	58
Calcium (mg/L)	129	117	133	119	86	57	56	72
Sodium (mg/L)	197	203	174	183	131	121	108	124
Potassium (mg/L)	1	2	2	2	1	<1	<1	<1
Dissolved Arsenic (mg/L)	NT	NT	NT	NT	NT	NT	NT	NT
Dissolved Cadmium (mg/L)	NT	NT	NT	NT	NT	NT	NT	NT
Dissolved Chromium (mg/L)	NT	NT	NT	NT	NT	NT	NT	NT
Dissolved Copper (mg/L)	<0.001	0.001	<0.001	<0.001	0.004	0.011	0.013	0.003
Dissolved Iron (mg/L)	0.49	0.07	0.23	0.13	<0.05	<0.05	<0.05	<0.05
Dissolved Lead (mg/L)	NT	NT	NT	NT	NT	NT	NT	NT
Dissolved Mercury (mg/L)	NT	NT	NT	NT	NT	NT	NT	NT
Dissolved Nickel (mg/L)	0.002	0.002	0.002	0.002	<0.001	0.002	0.002	0.001
Dissolved Zinc (mg/L)	0.031	0.055	0.039	0.031	0.158	0.157	0.055	0.048
Ammonia (mg/L)	0.25	0.18	0.25	0.19	<0.01	<0.01	0.09	0.02
Nitrate (mg/L)	0.04	0.09	0.13	0.12	1.74	0.85	0.52	0.82
TKN (mg/L)	0.4	1	0.6	2	0.8	2	0.6	0.9
Total Phosphorus (mg/L)	0.09	0.11	0.4	0.39	0.55	0.75	0.13	0.38
TOC (mg/L)	6	6	4	4	6	5	4	4
Oil & Grease (mg/L)	<5	<5	<5	<5	<5	<5	<5	<5
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2
Depth (mbgl)	10.7	10.5	9.38	10.1	10.5	9.3	9.08	10.1
NT = Not Tested								

Watercourse Quality Monitoring Results

	Watercourse 1				Watercourse 2			
	Sep-21	Dec-21	Apr-22	Jun-22	Sep-21	Dec-21	Apr-22	Jun-22
EC (µS/cm)	7.8	7.4	7	8.1	dry	7.9	8	dry
pH (pH units)	1080	1140	920	888	dry	1340	670	dry
Temperature (°C)	21.3	24.8	19.1	11.8	dry	27.5	19.5	dry
Turbidity (NTU)	8.4	4	22.8	2.7	dry	6.8	2.3	dry
Oil and Grease (mg/L)	<5	<5	<5	<5	dry	<5	<5	dry
TSS (mg/L)	39	12	34	6	dry	14	6	dry
TDS (mg/L)	756	698	652	562	dry	824	414	dry
Sodium (mg/L)	143	130	97	93	dry	142	62	dry
Potassium (mg/L)	1	<1	1	2	dry	1	<1	dry
Calcium (mg/L)	67	85	76	59	dry	98	49	dry
Sulphate (mg/L)	238	289	179	66	dry	437	145	dry
Chloride (mg/L)	41	33	22	33	dry	33	16	dry
Alkalinity (mg/L)	266	285	281	359	dry	195	139	dry
Dissolved Copper (mg/L)	0.004	0.004	0.004	0.005	dry	0.002	0.003	dry
Dissolved Iron (mg/L)	<0.05	<0.05	<0.05	0.06	dry	<0.05	<0.05	dry
Dissolved Arsenic (mg/L)	NT	<0.001	NT	NT	NT	NT	NT	NT
Dissolved Cadmium (mg/L)	NT	<0.0001	NT	NT	NT	NT	NT	NT
Dissolved Chromium (mg/L)	NT	<0.001	NT	NT	NT	NT	NT	NT
Dissolved Lead (mg/L)	NT	<0.001	NT	NT	NT	NT	NT	NT
Dissolved Mercury (mg/L)	NT	<0.0001	NT	NT	NT	NT	NT	NT
Dissolved Nickel (mg/L)	NT	<0.001	NT	NT	NT	NT	NT	NT
Dissolved Zinc (mg/L)	NT	<0.005	NT	NT	NT	NT	NT	NT

NT = Not Tested

Watercourse Flow Monitoring Results

	Flow (L/sec)	
Month	**WC1**	**WC2**
Jul-21	no flow	no flow
Aug-21	no flow	no flow
Sep-21	no flow	no flow
Oct-21	no flow	no flow
Nov-21	0.013	105
Dec-21	no flow	12
Jan-22	no flow	27
Feb-22	0.060	35
Mar-22	inaccessible	inaccessible
Apr-22	0.029	107
May-22	0.022	96
Jun-22	no flow	no flow

Stream West of Quarry Manager's Office

Date	pH (pH units)	Grease	TSS (mg/L)
07/07/2021	8	5	26
12/08/2021	8	<5	9
02/09/2021	8.3	<5	25
06/10/2021	8	<5	24
15/11/2021	8.1	<5	30
21/12/2021	7.8	<5	8
11/01/2022	7.9	<5	6
08/02/2022	8	<5	21
30/03/2022	8	<5	21
11/04/2022	7.9	<5	7
06/05/2022	8.1	<5	26
15/06/2022	8	<5	<5

Sewage Treatment Plan Effluent Monitoring

Date	Oil and Grease (mg/L)	TSS (mg/L)	(mg/L)
28/09/2021	<5	5	7
STP decommissioned December 2021			

Quarry Extension Discharge Monitoring

Date	pH (pH units)	rbidity (NTU
25/08/2021	7.3	23.1
26/08/2021	7.1	22.7
22/11/2021	7.1	12.8
09/12/2021	7.3	21.2
10/12/2021	7.6	23.4
10/01/2022	7.6	19.3
12/01/2022	7.3	21.2
23/02/2022	7.2	24.3
24/02/2022	7.5	25.4
25/02/2022	7	23.4
02/03/2022	7.6	31.2
03/03/2022	7.4	31.6
04/03/2022	7.7	27.3
07/03/2022	7.5	29.2
08/03/2022	7.2	30.6
09/03/2022	7.2	29.8
10/03/2022	7.6	31.2
28/03/2022	7.2	22.6
29/03/2022	7.6	23.7
30/03/2022	7.4	22.8
07/04/2022	7.6	21.4

Deposited Dust Monitoring

All in g/m^2/mth	APD1		APD2		APD3		APD4	
Month	Ash	TIS	Ash	TIS	Ash	TIS	Ash	TIS
Jul-21	8.0	8.7	0.8	1.0	1.0	1.3	1.2	1.5
Aug-21	9.5	10.4	1.0	1.2	0.2	0.4	0.2	0.3
Sep-21	6.8	8.5	1.2	1.5	1.1	1.4	6.6	7.3
Oct-21	6.0	7.2	1.1	1.6	0.9	1.3	*	*
Nov-21	4.5	5.2	2.4	5.3	0.2	0.9	0.5	0.6
Dec-21	8.0	9.3	1.5	2.2	0.8	1.5	1.0	1.4
Jan-22	4.4	6.2	0.9	1.3	0.8	2.1	0.8	1.0
Feb-22	6.1	8.0	1.9	2.6	0.5	0.6	1.2	1.4
Mar-22	4.8	6.0	0.9	1.2	0.4	0.6	0.9	1.1
Apr-22	2.8	4.0	0.5	1.0	0.2	0.6	0.7	1.2
May-22	2.1	2.4	0.6	0.7	0.1	0.1	0.8	1.6
Jun-22	3.8	4.7	0.3	0.4	0.3	0.5	0.8	1.0
* funnel missing/broken - sample not able to be collected								

HVAS PM_{10} Monitoring

Date	PM10 (µg/m^3)	Date	PM10 (µg/m^3)	Date	PM10 (µg/m^3)	Date	PM10 (µg/m^3)
02/07/2021	8.4	06/10/2021	19.2	04/01/2022	8.8	04/04/2022	15.1
08/07/2021	30.7	12/10/2021	4.2	10/01/2022	9.4	10/04/2022	5.0
14/07/2021	11.2	18/10/2021	16.9	16/01/2022	12.2	16/04/2022	6.8
20/07/2021	17.6	24/10/2021	7.8	22/01/2022	4.7	22/04/2022	5.5
26/07/2021	20.3	30/10/2021	13.2	28/01/2022	11.5	28/04/2022	2.7
01/08/2021	8.2	05/11/2021	5.2	03/02/2022	14.0	04/05/2022	13.5
07/08/2021	2.0	11/11/2021	7.1	09/02/2022	13.8	10/05/2022	3.8
13/08/2021	14.1	17/11/2021	8.0	15/02/2022	3.4	16/05/2022	16.9
19/08/2021	26.1	23/11/2021	9.1	21/02/2022	3.8	22/05/2022	0.6
25/08/2021	0.9	29/11/2021	10.7	27/02/2022	5.8	28/05/2022	4.0
31/08/2021	19.5	05/12/2021	8.5	05/03/2022	8.8	03/06/2022	24.6
06/09/2021	7.7	11/12/2021	8.7	11/03/2022	1.2	09/06/2022	41.1
12/09/2021	34.0	17/12/2021	12.6	17/03/2022	10.0	15/06/2022	25.3
18/09/2021	16.3	23/12/2021	5.4	23/03/2022	9.3	21/06/2022	32.2
24/09/2021	44.7	29/12/2021	0.9	29/03/2022	0.0	27/06/2022	8.8
30/09/2021	9.4						

Annexure F

Annual Noise Survey – August 2021

Refer to Cleary Bros website for the report (www.clearybros.com.au/albion-park)