Albion Park Quarry
Annual Review

Period 01 July 2020 – 30 June 2021

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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	1/7/2020
Annual Review end date	30/6/2021
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 2020 to 30 June 2021 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	20/7/2021

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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
DPIE	Department of Planning Industry 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
OEH	Office of Environment and Heritage
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	H Cleary	15/7/21
2	Final	M Hammond	H Cleary	20/7/21

1. INTRODUCTION

1.1 Statement of Compliance

Were all conditions of the relevant approvals complied with?	
Development Consent #10639/2005	No
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 2 June 2020 as part of a five-yearly review of the licence. 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.

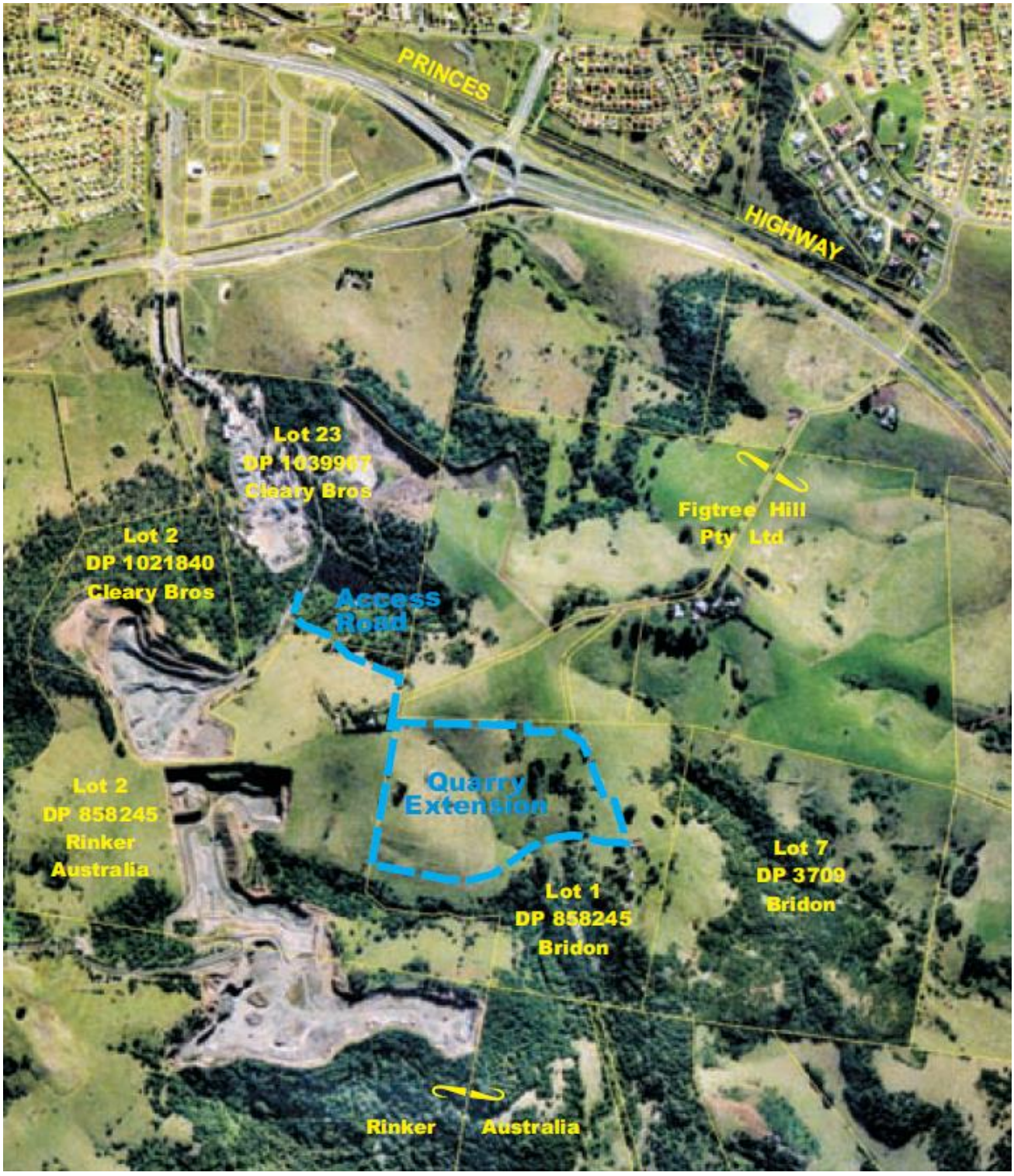


Figure 1 – Regional context and site boundaries

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 & 5.4
Schedule 4 Condition 44	The Applicant must include a progress report on the Rehabilitation Management Plan in the **Annual Review**.	Section 3.7 & 5.5
Schedule 4 Condition 53	The Applicant must include a progress report on the Heritage Management Plan in the **Annual Review**	Section 5.6
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 5.7
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 2020 to June 2021 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 was completed in the final revegetation area in 2020-21 in response to improved rainfall, with all zones now in the maintenance stage.

2.3 Works to be completed in the Next Period

In the period July 2021 to June 2022 quarry extraction will continue in Stages 5 and 6 of the quarry. A small amount of overburden stripping is anticipated in the next period in the southern part of Stage 6.

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 2020. This return indicates a total of 841,029 tonnes of material was sold from the quarry, which includes 5,824 tonnes of concrete returns incorporated into Enviropave, and which equates to the total hard rock extracted from the extended quarry area of 835,205 tonnes.

In the current reporting period, 476,183 tonnes of blue rock (basalt) and 287,701 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 434 tonnes of overburden and 11,760 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 2020 to NSW Industry and Investment is included as Annexure A. The next annual return to NSW Department of Regional NSW is due by November 2021.

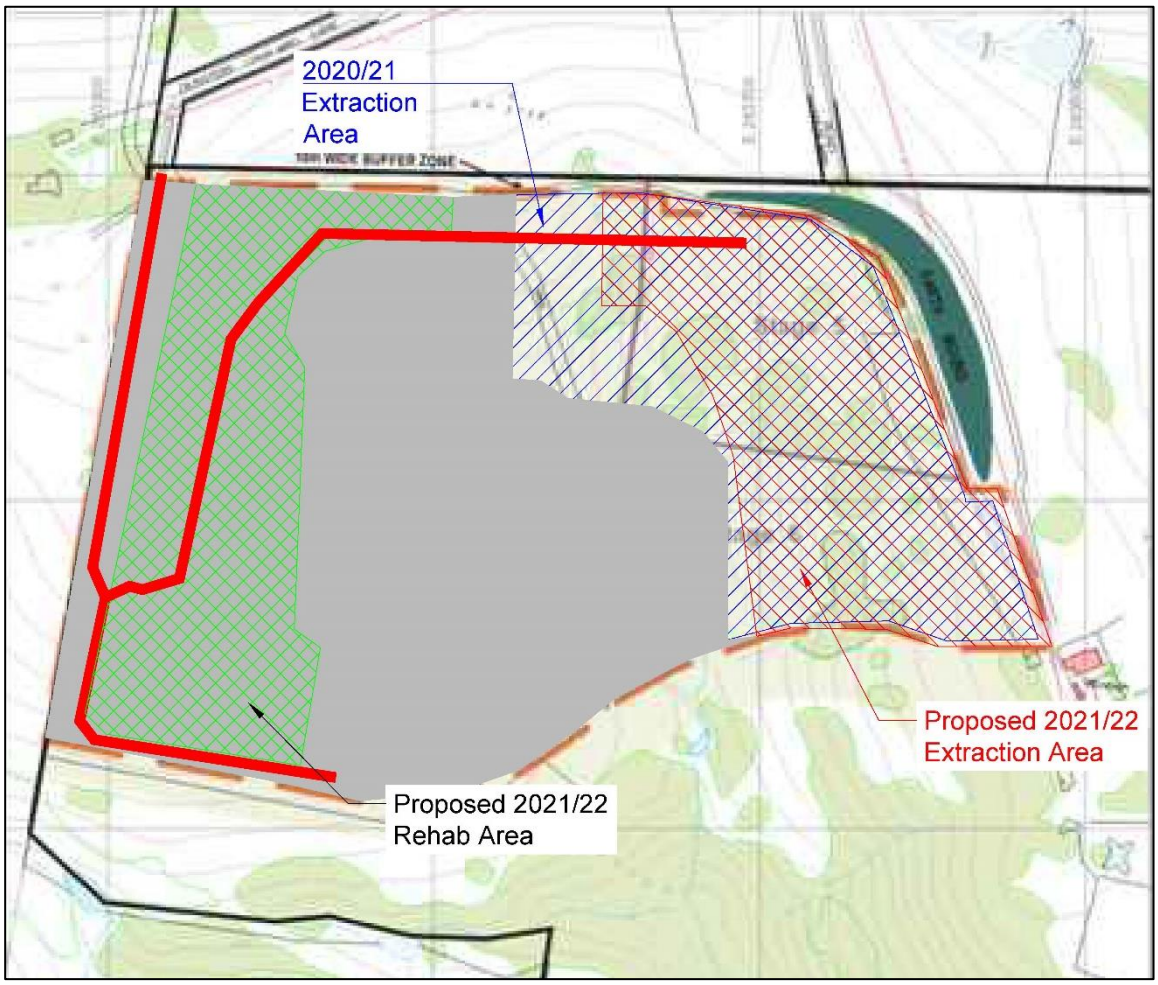


Figure 2 – Works Completed and Works Programmed

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 2020 to 30 June 2021.

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.

Rainfall in the current reporting period has been above average, with 1,503 mm recorded at the site weather station. Rainfall was distributed well throughout the year, with significant totals experienced in July (256mm) and August (199mm) 2020, and in March (276mm) and May (193mm) 2021. Most months recorded some rainfall, with April 2021 (7mm) the driest month followed by September 2020 (40mm). To allow a comparison with long term average precipitation, rainfall recorded in the current year at the two nearest BOM sites with current operating weather stations and long term (>100 year) datasets has been examined against the long term averages for those localities. 1,307 mm was recorded at the BOM Kiama (Bombo Headland) weather station compared with a long term average of 1,254 mm for Kiama (Kiama Bowling Club), while 1,379 mm was recorded at the BOM Albion Park (Shellharbour Airport) weather station compared with a long term average of 1,098 mm for Albion Park (Albion Park Post Office). This shows that the region experienced rainfall above the long term average, albeit following on from three years of significantly below average rainfall since July 2017.

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 a deficit of 1220mm at the start of the reporting period (June 2020) on the back of three significantly dry years, with the deficit reducing by 282mm to 940mm at the end June 2021. A similar comparison of rainfall measured at the Kiama (Bombo Headland) weather station with the long term average for Kiama (Bowling Club) shows a deficit of 1593mm at June 2020, reducing to 1540mm by the end of June 2021. The cumulative rainfall deficit has impacted surface water flows and groundwater levels in previous years, with some recovery seen this year with the improved rainfall conditions, as will be described in the following sections.

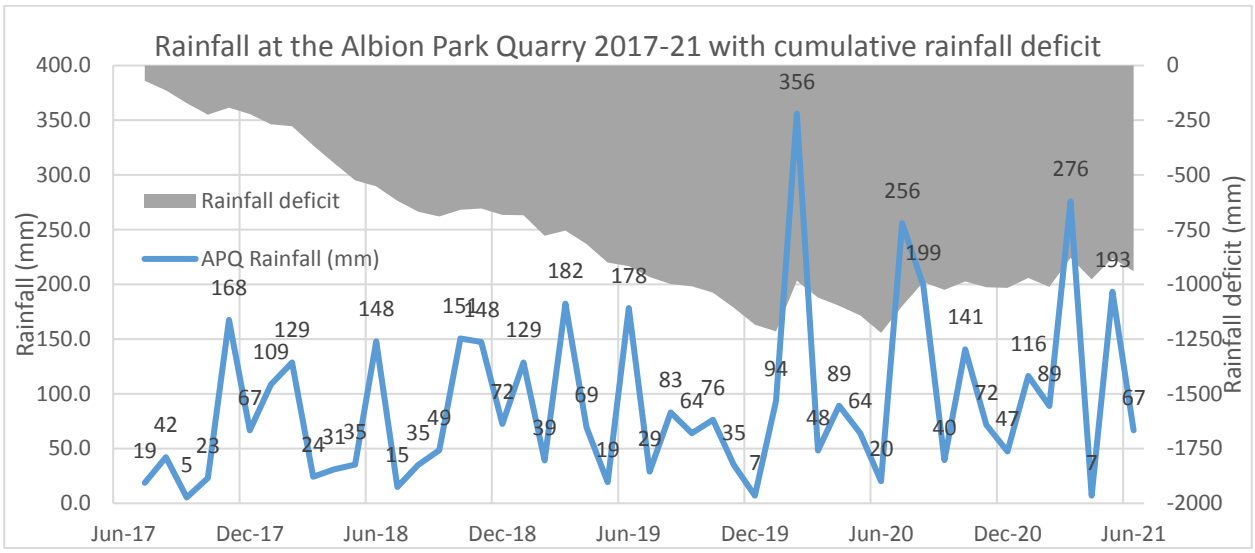


Figure 3 – Rainfall measured on site FY18-FY21, with the cumulative rainfall deficit for Albion Park shown

3.1.3 Compliance Assessment

The weather station was operated continuously 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 programme 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
Oil and Grease	mg/L

Analyte	Units
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 programme to assess the possible relationships between surface water and groundwater and to determine the origin of the variation in creek water quality.

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

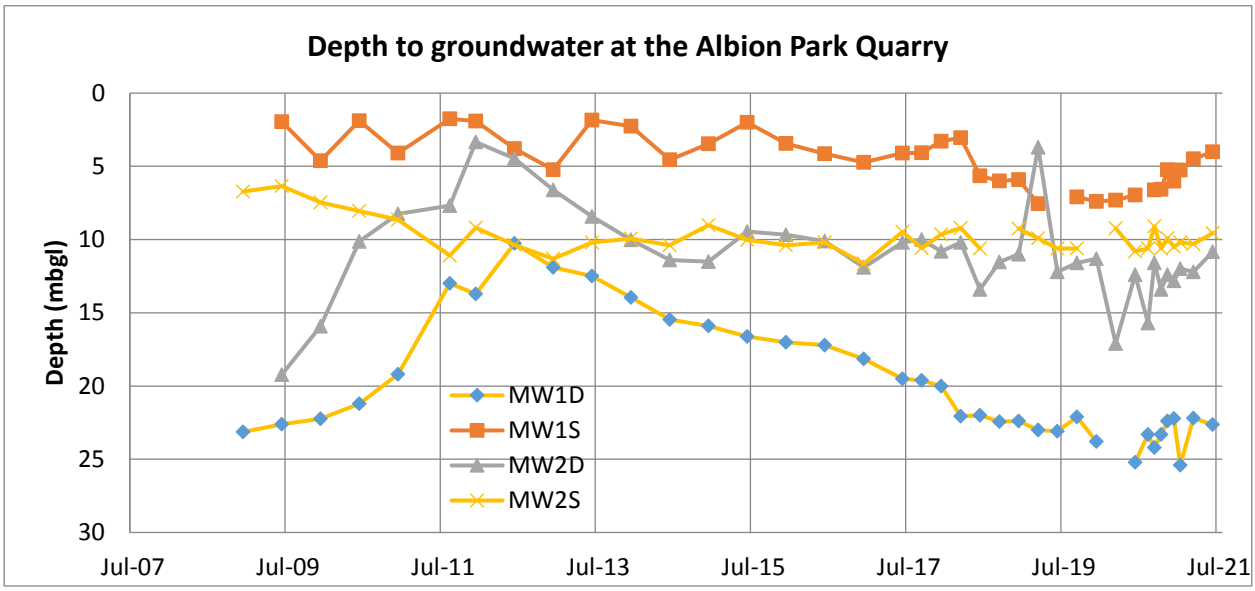
CB has implemented the Groundwater Monitoring Programme at the Albion Park Quarry, with the two shallow and two deep groundwater monitoring bores measured quarterly each during the reporting period for the parameters listed in the table above, with sampling increased to monthly from August 2020 to January 2021 for a reduced suite of analytes in line with recommendations from the 2019-20 Annual Review. 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 wells 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	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	22.2	23.21	25.41	10.26	18.94	25.2
MW1S	6.95	7.19	7.4	1.75	3.81	7.55
MW2D	11.3	13.10	17.1	3.34	10.05	19.22
MW2S	9.23	10.21	10.8	6.35	9.61	11.64

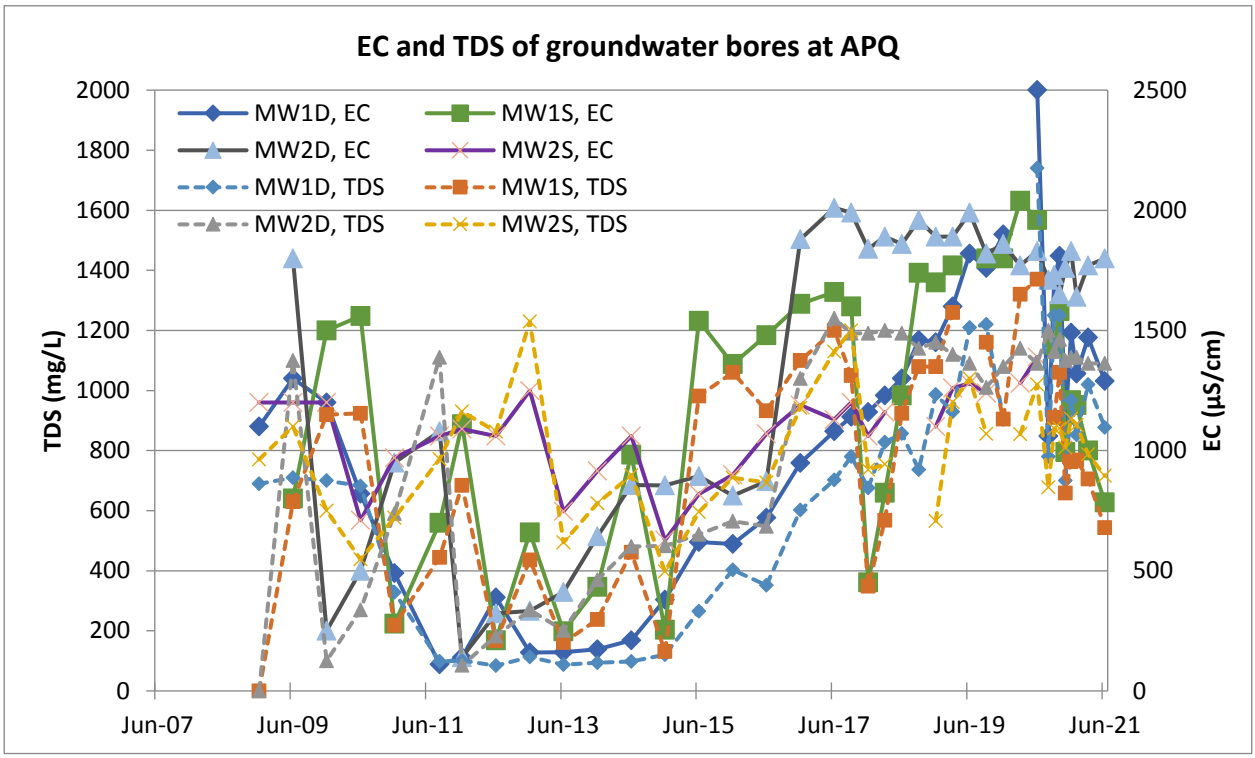


Groundwater levels in all monitoring bores have generally shown an increase in groundwater level during the current reporting period, with the change generally more noticeable in MW1S and MW2D. The increases in groundwater level are likely to be partly related to the higher rainfall observed in the current reporting period. There are no consistent spikes in groundwater level observable across the monitoring network, suggesting a slow response to climatic effects. Bores MW1D experienced one measurement slightly below the historical range of records before recovering to levels closely resembling those observed through the recent dry period. Quarry extraction included the closest point to the MW1 bores during the current reporting period, with bore MW1S showing a steady rise throughout the year, while MW1D is around pre-quarrying groundwater levels.

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

EC µS/cm	2020/21 Reporting Period			Historical Results			Pre-quarrying maximum
	Min	Ave	Max	Min	Ave	Max	
MW1D	1060	1409	1810	110	963	2500	2700
MW1S	784	1171	1580	211	1189	2040	1236
MW2D	1640	1736	1830	140	1283	2010	2000
MW2S	925	1172	1320	627	1080	1390	1305
TDS mg/L	**2020/21 Reporting Period**			**Historical Results**			
	Min	**Ave**	**Max**	**Min**	**Ave**	**Max**	
MW1D	700	962	1250	84	590	1740	
MW1S	543	773	1060	131	777	1370	
MW2D	1090	1125	1200	85	785	1240	
MW2S	678	817	906	397	791	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, particularly in recent months. During the current reporting period, all EC and TDS measurements were recorded within the historical ranges of the respective bores. Furthermore, the TDS of MW1S and MW1D were both recorded above the historical ranges for the respective bores. The electrical conductivity and TDS of the deeper groundwater monitoring bores appears to be following a rough inverse of water level, suggesting higher volumes of water in the aquifer are mirrored by lower ion concentrations, which may be expected in a localised groundwater system that is dependent on rainfall.

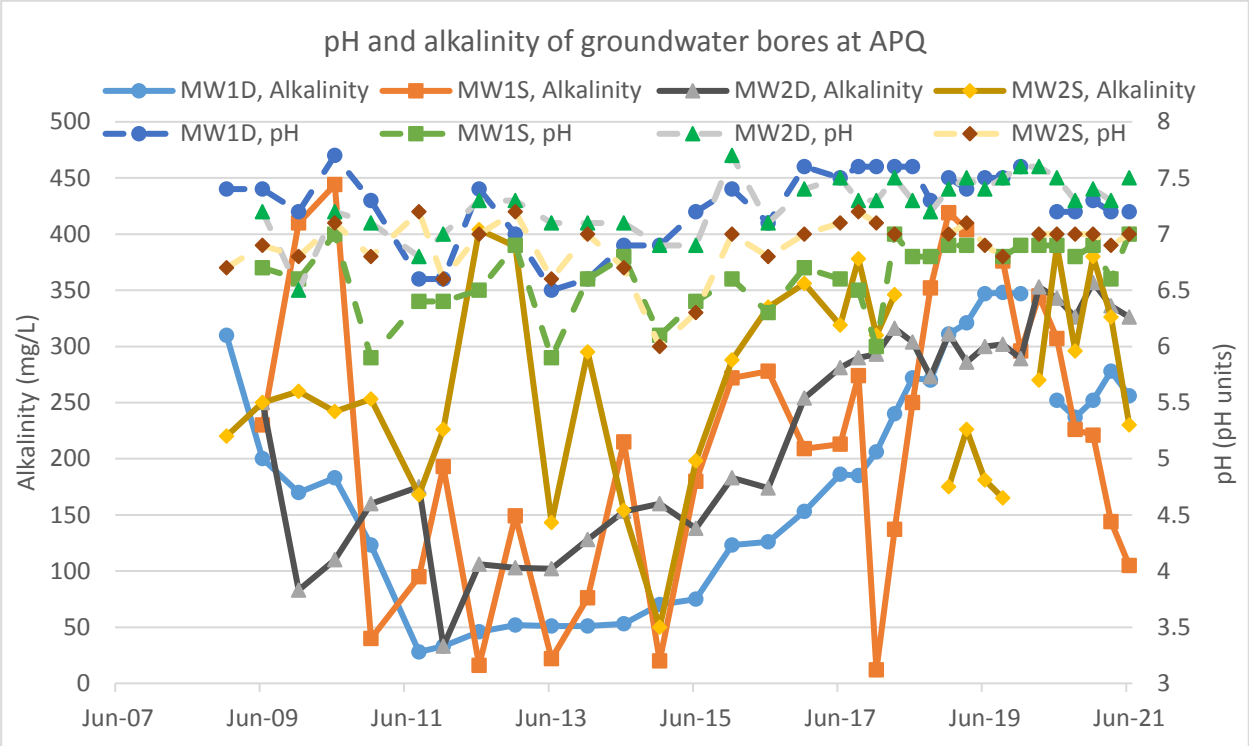


The electrical conductivity levels recorded in all bores were at times above the levels nominated in the Water Management Plan requiring additional monitoring for dissolved metals. The testing for the full metals suite confirmed that the increase in electrical conductivity was not associated with any decrease in groundwater quality in relation to dissolved metals concentration and likely to be associated with the ongoing rainfall deficit experienced during the reporting period.

pH and Alkalinity

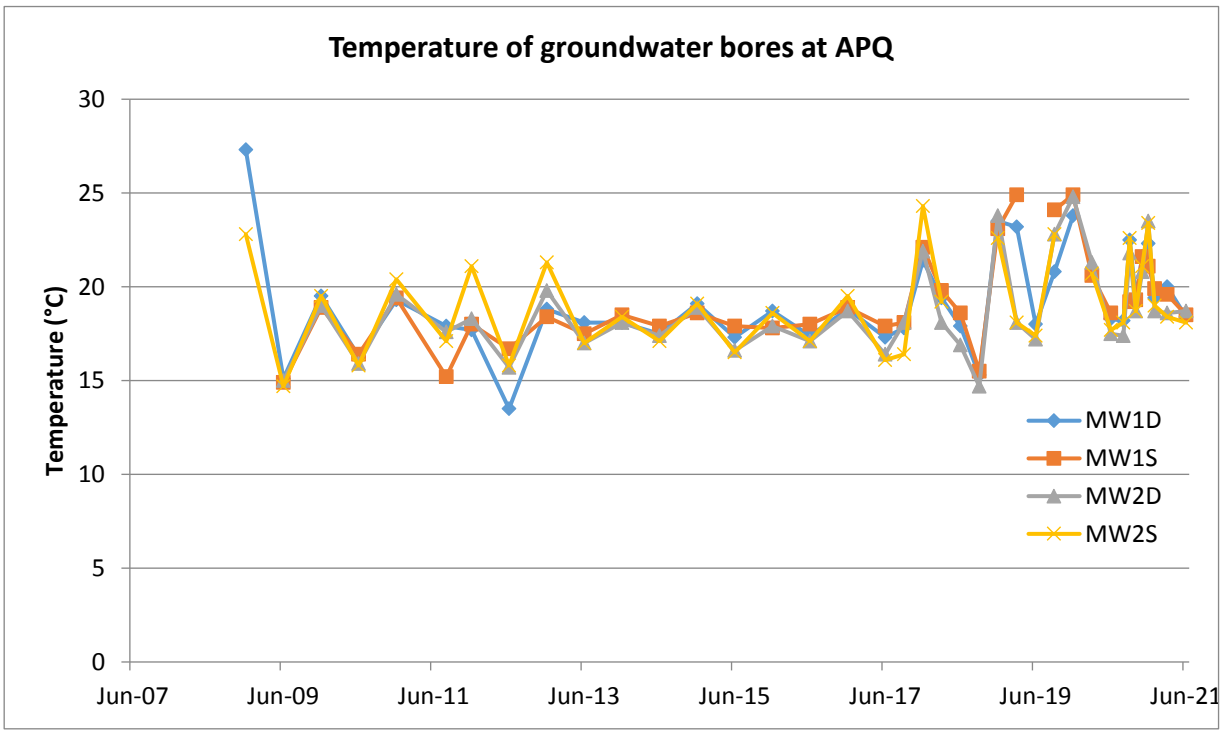
pH pH units	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	6.8	7.1	7.3	6.5	7.3	7.7
MW1S	6.6	6.8	7.0	5.9	6.6	7.0
MW2D	7.3	7.4	7.5	6.5	7.3	7.7
MW2S	6.6	6.9	7.0	6.0	6.9	7.2
Alkalinity mg/L as $CaCO_3$	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	237	256	278	28	177	348
MW1S	105	174	226	12	223	444
MW2D	326	336	357	33	216	353
MW2S	230	308	380	50	259	404

The pH measured in all groundwater bores has remained stable within a very narrow range in the current reporting period and within the historical averages of the respective bores. Alkalinity has continued to show considerable variability, especially in the shallow bores. All results were within the historical ranges for the respective bores for pH and alkalinity with the exception of one result for alkalinity from MW2D, which was close to the historical range and relatively stable. 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 to respond to any adverse external influences.



Temperature (°C)

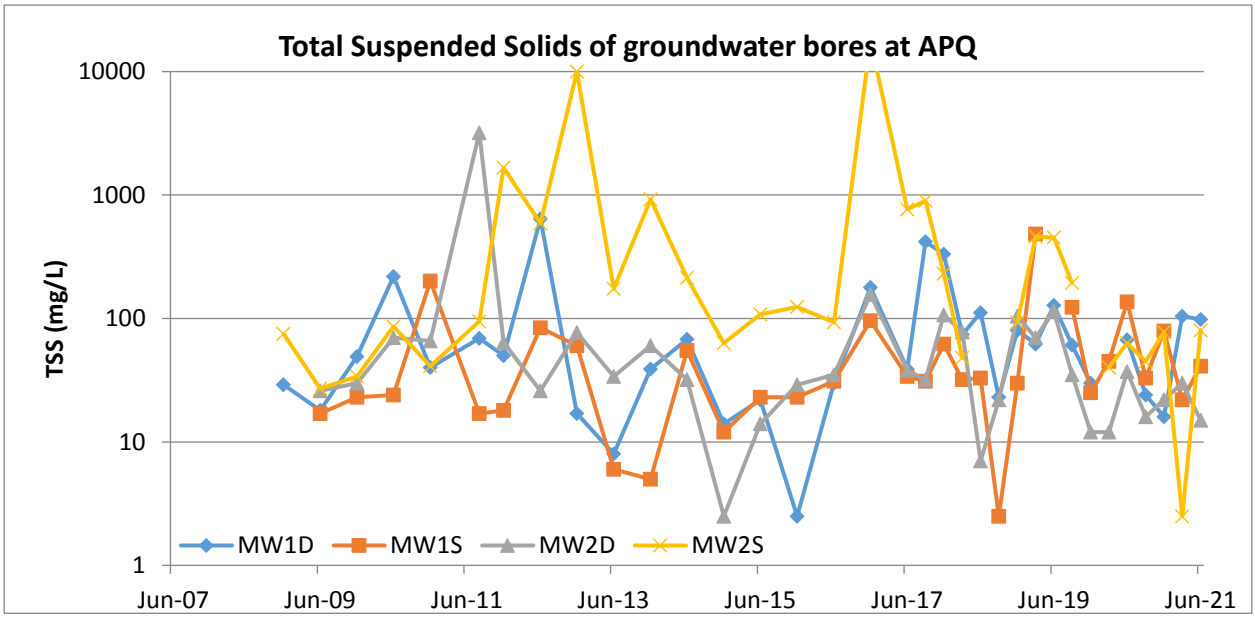
Temperature °C	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	18.2	20.2	22.5	13.5	18.9	27.3
MW1S	18.5	19.9	21.6	14.9	19.0	24.9
MW2D	17.4	19.8	23.5	14.7	18.4	24.8
MW2S	18.1	19.9	23.4	14.7	18.8	24.3



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

Total Suspended Solids (mg/L)

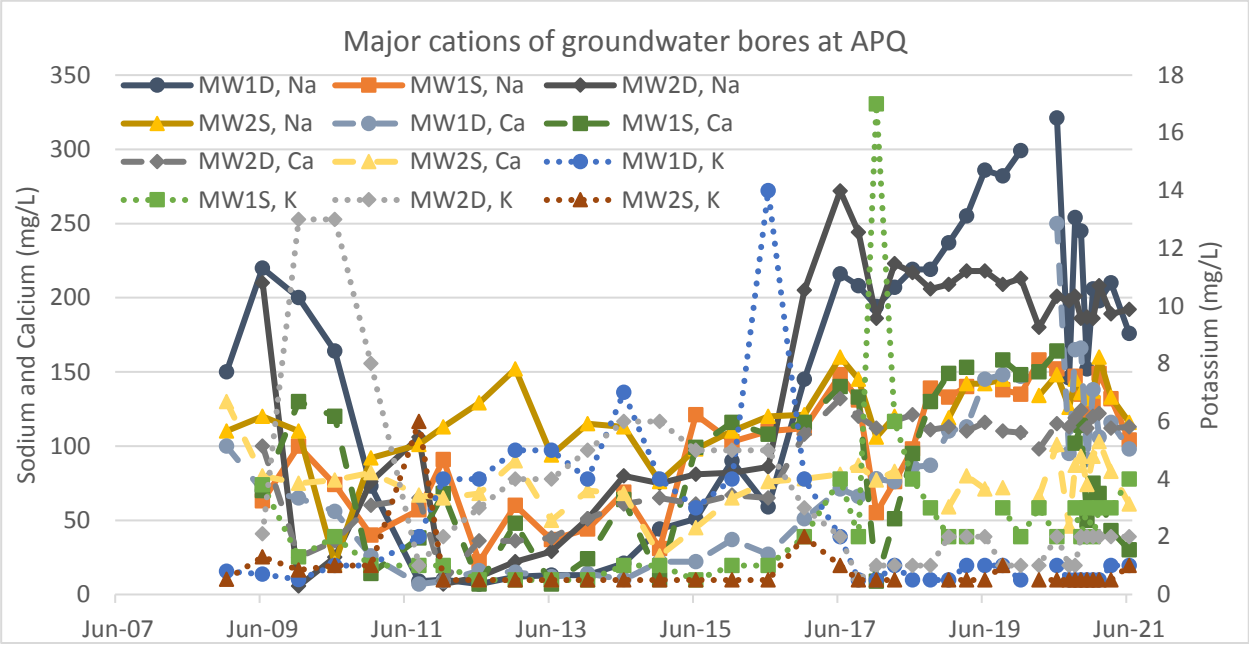
TSS mg/L	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	16	61	104	<5	101	640
MW1S	22	44	79	<5	62	483
MW2D	15	21	30	<5	158	3200
MW2S	<5	51	80	27	1308	17800



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)

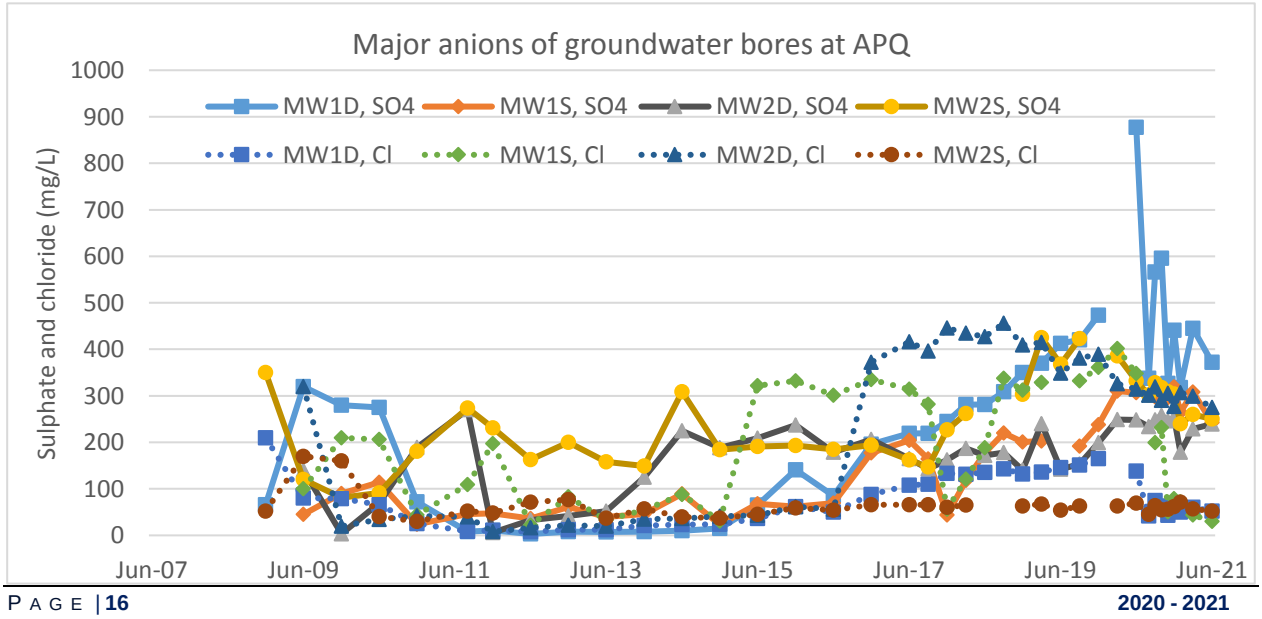
Sodium mg/L	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	146	198	254	7	146	321
MW1S	104	131	149	22	94	158
MW2D	186	193	208	5.7	136	272
MW2S	116	136	160	21	117	160
Potassium mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<1	<1	1	<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	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	91	122	166	7	67	250
MW1S	30	69	114	7	90	164
MW2D	112	117	124	9	82	132
MW2S	46	80	103	26	74	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)

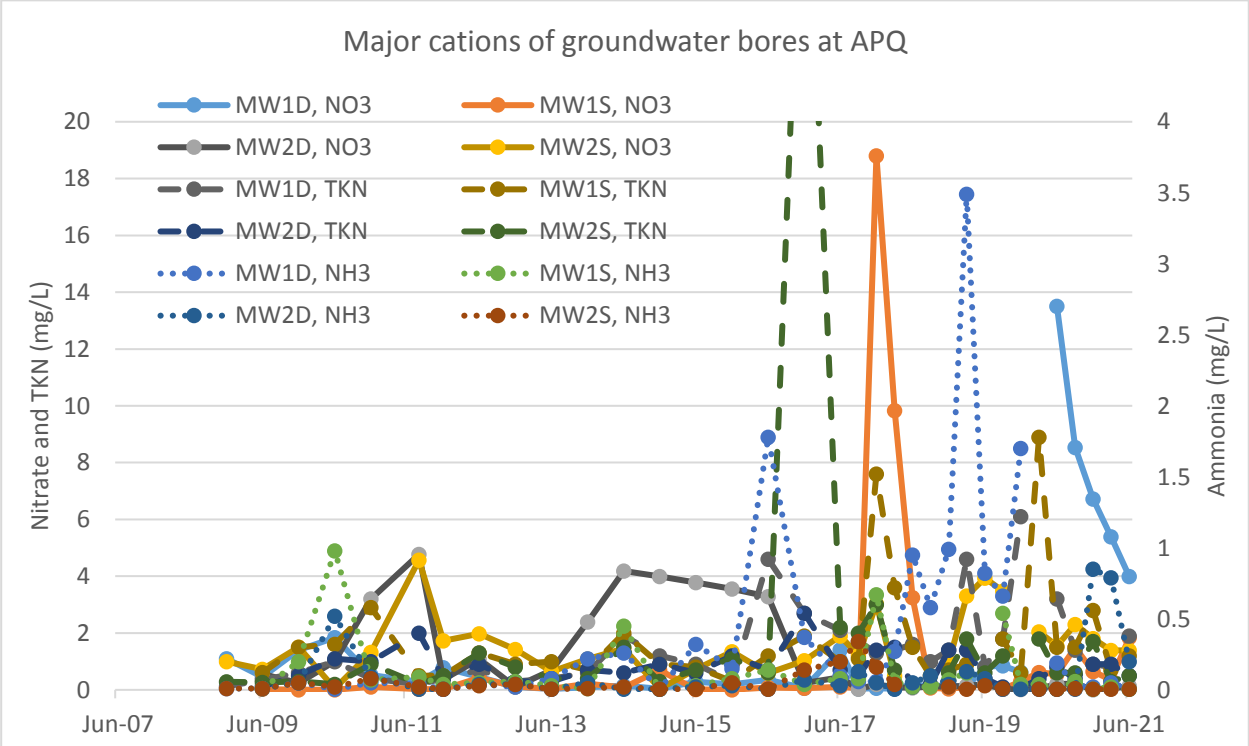
Sulphate mg/L	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	318	425	596	3	208	877
MW1S	243	291	319	23	122	310
MW2D	179	236	258	3.3	157	270
MW2S	240	289	328	81	233	425
Chloride mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	42	55	75	8	84	210
MW1S	30	101	232	22	209	402
MW2D	275	297	319	8	218	456
MW2S	45	58	71	30	64	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 bores have shown significant variability in chloride and sulphate concentrations in the current reporting period, which is a common feature observed throughout the historical monitoring record.

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

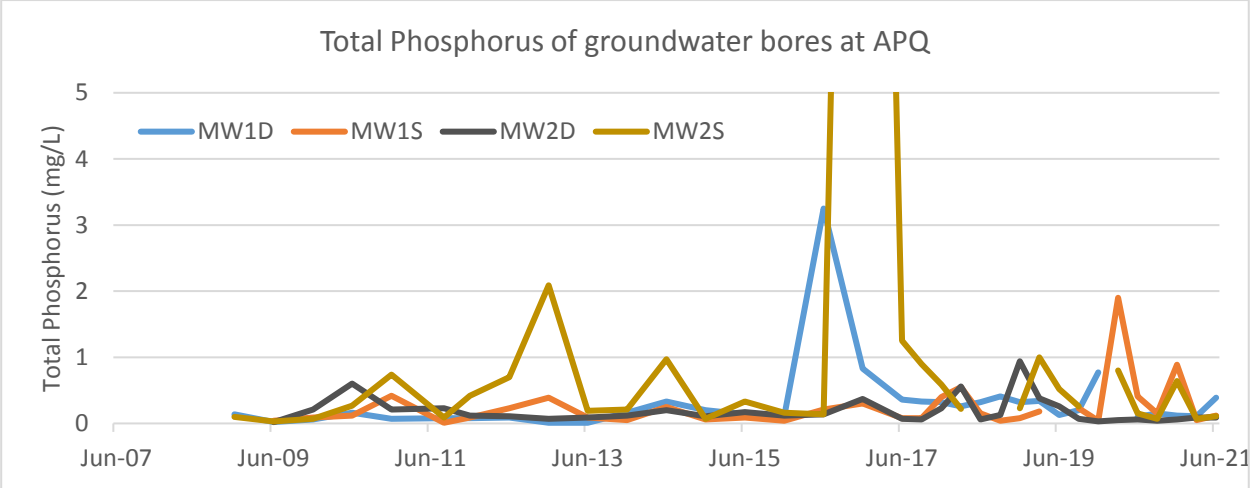
Nitrate as N mg/L	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	3.99	6.16	8.53	0.03	0.90	13.5
MW1S	0.35	1.08	1.84	<0.01	1.27	18.8
MW2D	<0.01	0.10	0.22	0.01	1.21	4.77
MW2S	1.39	1.72	2.3	0.04	1.60	4.57
Ammonia as N mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.01	0.03	0.05	<0.01	0.46	3.49
MW1S	<0.01	0.02	0.06	<0.01	0.14	0.98
MW2D	<0.01	0.46	0.85	<0.01	0.05	0.52
MW2S	<0.01	<0.01	0.01	<0.01	0.05	0.34
TKN as N mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.8	1.3	1.9	0.1	1.5	6.1
MW1S	0.7	1.6	2.8	0.3	1.7	8.9
MW2D	0.4	0.7	0.9	0.1	0.8	2.7
MW2S	0.3	0.8	1.7	0.2	2.1	31.9



Measurements of all nitrogen species during the reporting year were within the historical levels for each bore, with the exception of two slightly elevated ammonia results for bore MW2D, with the ammonia since returning to the historical range. Concentrations of all nitrogen species showed less variability than in recent years, likely related to fresh groundwater inflows with the improved rainfall conditions.

Total Phosphorus (mg/L)

Phosphorus mg/L	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.11	0.19	0.39	0.01	0.33	3.25
MW1S	0.05	0.30	0.89	0.01	0.24	1.9
MW2D	0.04	0.07	0.09	0.02	0.20	0.94
MW2S	0.07	0.22	0.64	0.03	1.43	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.

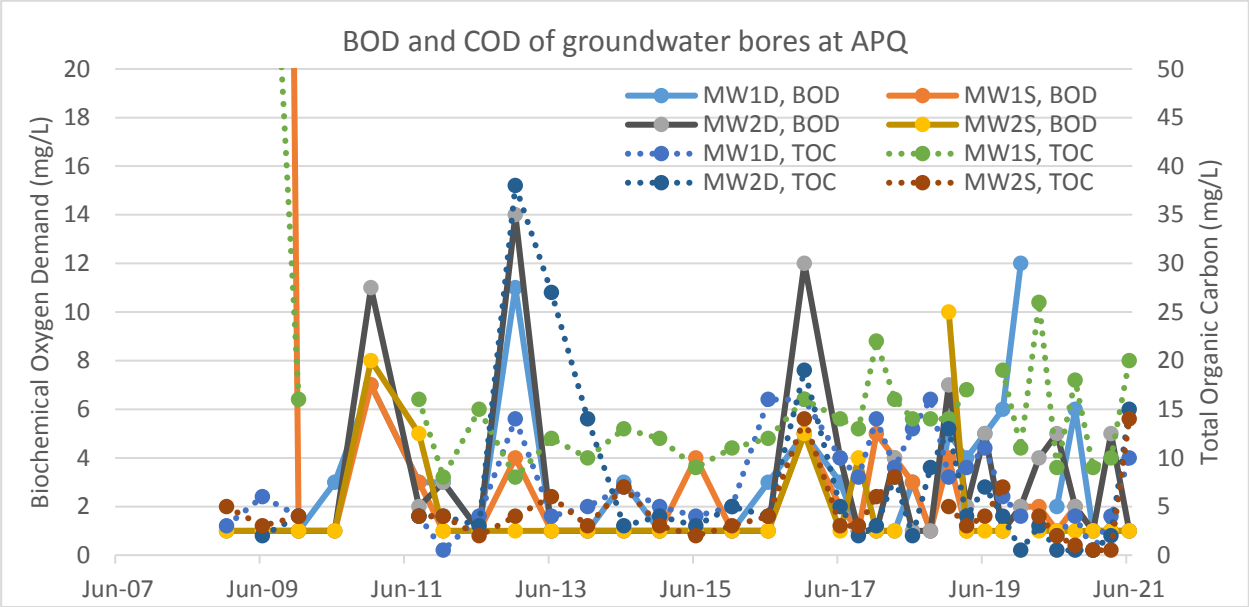
Oil and Grease (mg/L)

Oil and Grease mg/L	2020/21 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	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	<2	2	6	<2	3	12
MW1S	<2	<2	<2	<2	8	150
MW2D	<2	2	5	<2	3	14
MW2S	<2	<2	<2	<2	2	10
TOC mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<1	5	10	<1	8	16
MW1S	9	14	20	8	17	88
MW2D	<1	5	15	<1	7	38
MW2S	<1	4	14	2	5	14



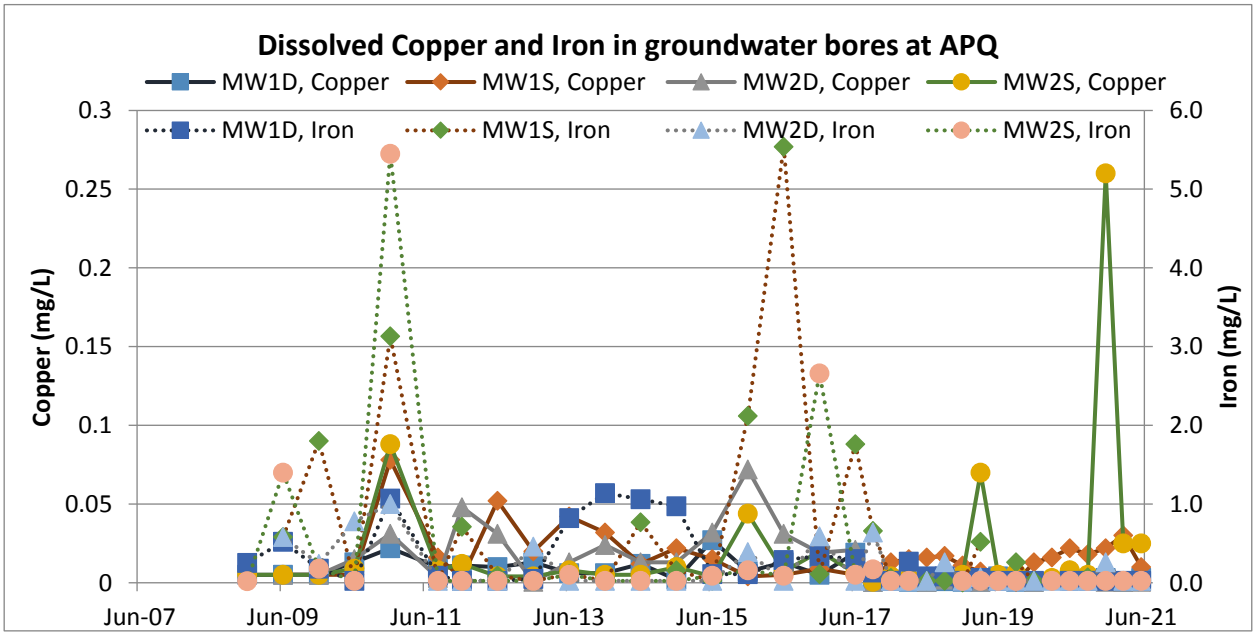
The results for Biochemical Oxygen Demand and Total Organic Carbon in the current reporting period are low and consistent with historical results.

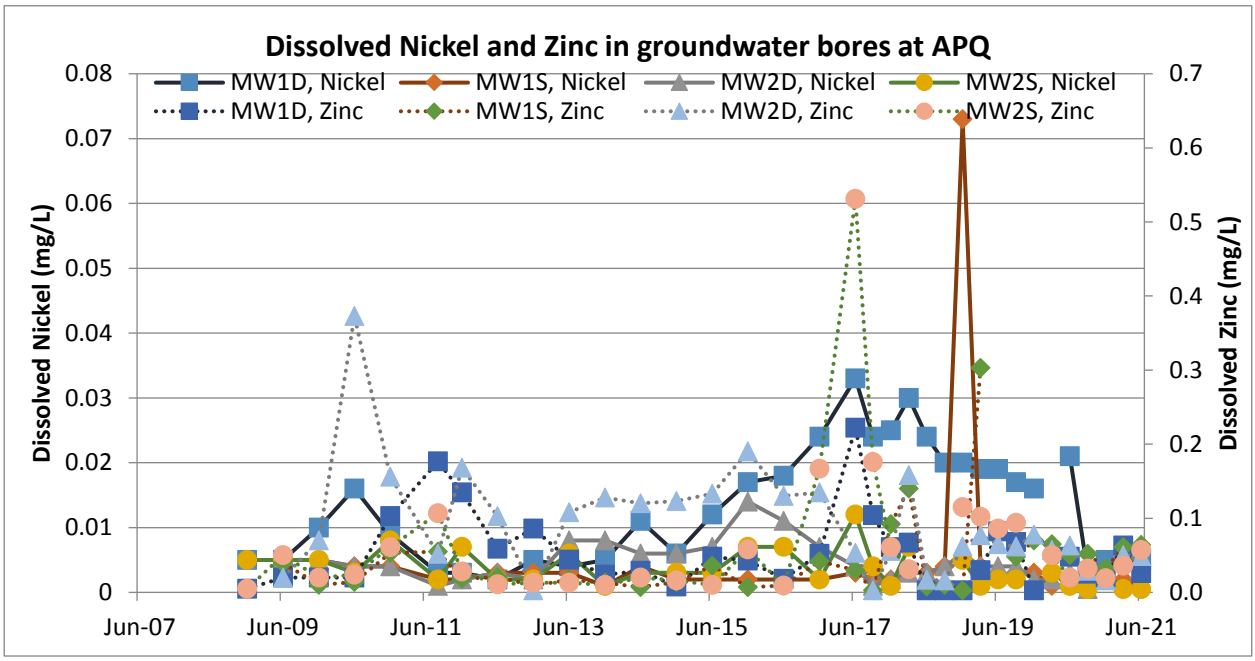
Total Dissolved Metals (mg/L)

Concentrations of copper, iron, nickel and zinc are routinely measured in groundwater bores at the Albion Park Quarry, with this sampling programme extended to arsenic, cadmium, chromium, lead and mercury where the electrical conductivity triggers are met as described in Section 3.2.1.

Dissolved Copper mg/L	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.001	0.002	0.003	<0.001	0.007	0.027
MW1S	0.01	0.020	0.03	<0.001	0.017	0.078
MW2D	<0.001	0.002	0.005	<0.001	0.014	0.072
MW2S	0.005	0.079	0.26	<0.001	0.013	0.088
Dissolved Iron mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.05	<0.05	<0.05	<0.05	0.28	1.14
MW1S	<0.05	0.04	0.07	<0.05	0.67	5.54
MW2D	<0.05	0.08	0.26	<0.05	0.19	1.00
MW2S	<0.05	<0.05	<0.05	<0.05	0.40	5.45
Dissolved Nickel mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.003	0.005	0.005	<0.01	0.015	0.033
MW1S	<0.001	0.001	0.002	<0.01	0.005	0.073
MW2D	<0.001	0.003	0.007	<0.01	0.005	0.014
MW2S	<0.001	0.001	0.003	<0.01	0.004	0.012
Dissolved Zinc mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	0.020	0.034	0.063	<0.005	0.055	0.22
MW1S	0.032	0.052	0.064	<0.005	0.042	0.30
MW2D	0.016	0.036	0.050	<0.005	0.096	0.37
MW2S	0.019	0.036	0.057	<0.01	0.070	0.53

Dissolved Arsenic mg/L	2020/21 Reporting Period			Historical Results		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.001	<0.001	<0.001	<0.001	0.002	0.005
MW1S	<0.001	<0.001	<0.001	<0.001	0.003	0.006
MW2D	0.002	0.002	0.002	<0.001	0.002	0.005
MW2S	<0.001	<0.001	<0.001	<0.001	0.002	0.005
Dissolved Cadmium mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0002
MW1S	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
MW2D	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0004
MW2S	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0171
Dissolved Chromium mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MW1S	<0.001	<0.001	0.001	<0.001	<0.001	0.001
MW2D	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
MW2S	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Lead mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.001	<0.001	0.001	<0.001	0.004	0.047
MW1S	<0.001	<0.001	<0.001	<0.001	0.002	0.010
MW2D	<0.001	<0.001	<0.001	<0.001	0.001	0.005
MW2S	<0.001	<0.001	<0.001	<0.001	0.003	0.012
Dissolved Mercury mg/L	**2020/21 Reporting Period**			**Historical Results**		
	Min	Ave	Max	Min	Ave	Max
MW1D	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.01
MW1S	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.01
MW2D	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.01
MW2S	<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 with the exception of a single anomalous dissolved copper measurement for MW2S, which returned to typical concentrations for the following sampling period. 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.

All bores were tested for the extended metals suite at various times throughout the reporting period where the electrical conductivity trigger for extended metals testing was met. Most results returned below the limit of reporting for the respective analytes, and all were within the historical ranges for the respective bores and analytes, 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 start of a recovery in groundwater levels and reductions in major ion concentrations, with the above average rainfall likely 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. While there were isolated measurements of groundwater level or quality outside of the historical ranges for the respective bores, these were very much the exemption, with most results trending towards the average throughout the reporting period. The increased monitoring frequency (to monthly) from August 2020 to January 2021 allowed improved insight into these changes, however based on the current trends, restating the previous quarterly monitoring programme is appropriate going forward.

All activities related to groundwater management in the current reporting period have proceeded 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 programme 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#	
Main Holding Dam	pH	pH units	6.5 – 8.5	Daily during overflow
	Total Suspended Solids	mg/L	50	
Watercourse West of Quarry Manager's Office	pH	pH units		Daily during overflow of main sedimentation pond
	Total Suspended Solids	mg/L		
Watercourse 1 and Watercourse 2	Discharge	L/s		Monthly
	Electrical Conductivity	µS/cm		Quarterly
	pH	pH units		
	Temperature	°C		
	Turbidity	NTU		
	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). 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 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

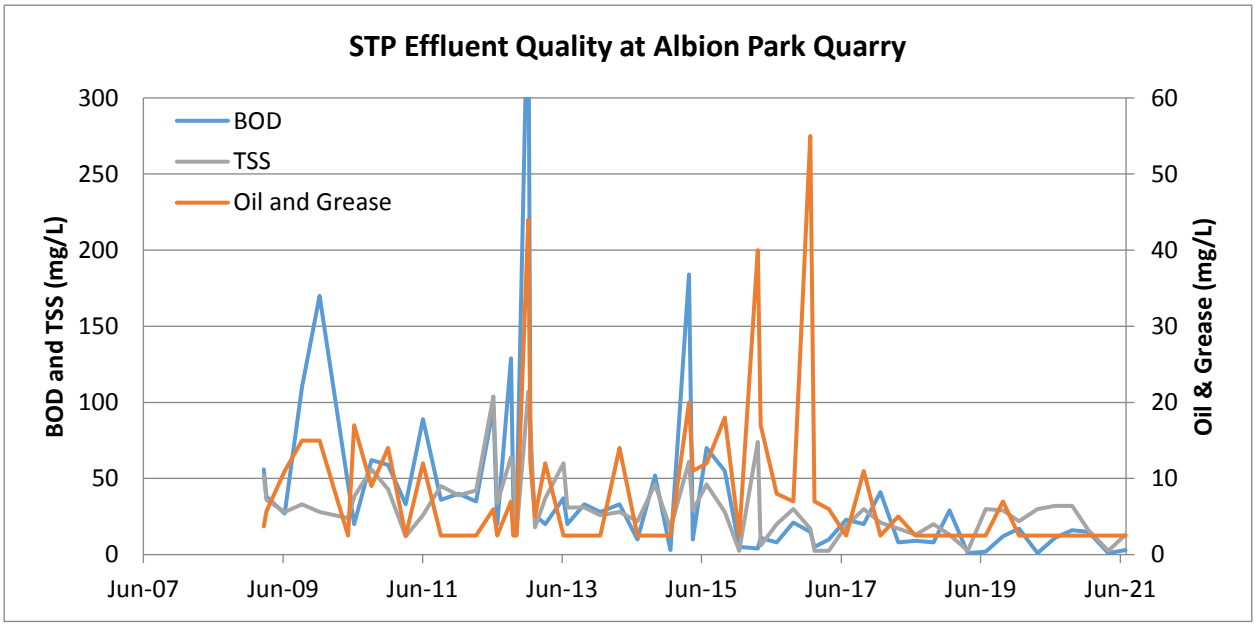
CB has implemented the Surface Water Monitoring Program at the Albion Park Quarry, with all routine sampling undertaken as required by the table above. During the reporting period, water was discharged from the sump in the Quarry Extension on 10 occasions across 32 days, with daily sampling of water quality undertaken as specified by the table above. It is estimated that approximately 292ML of water was discharged from the quarry pit across the reporting period. All discharges occurred during or shortly after rainfall events. There were also four occasions (across five 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 Plan Monitoring

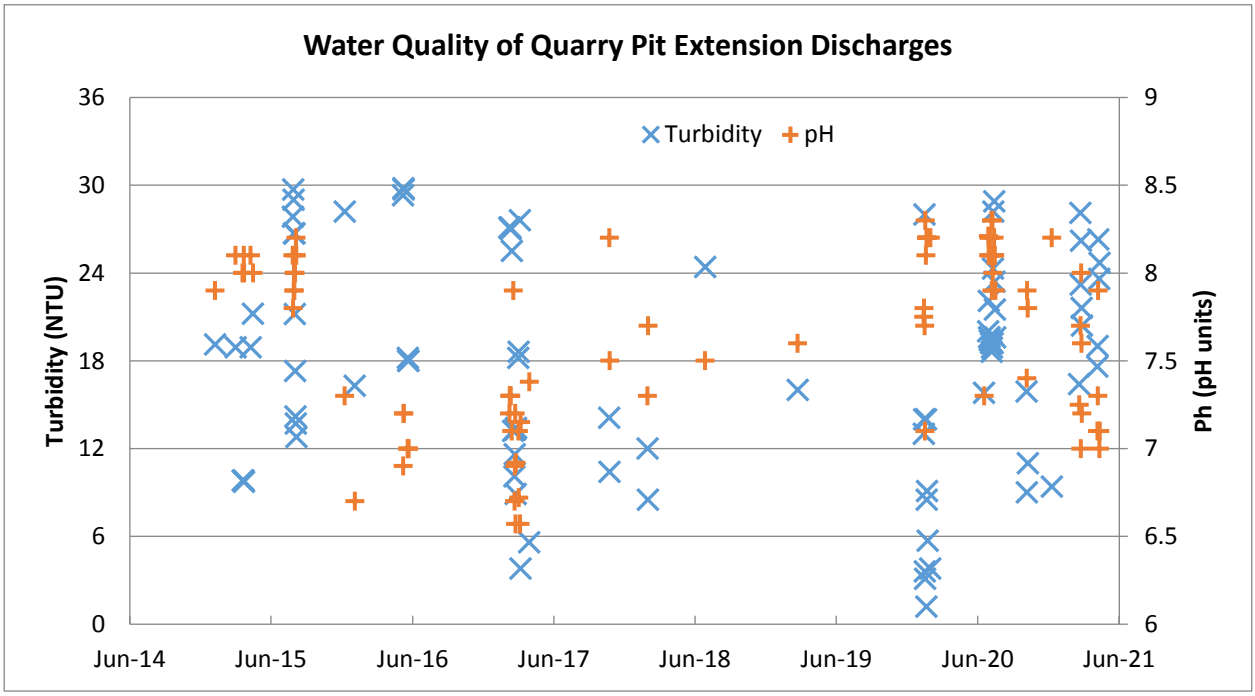
Analyte	Unit	2020/21 Reporting Period			Historical Results			DC limit	EPL trigger
		Min	Ave	Max	Min	Ave	Max		
Oil and Grease	mg/L	<5	<5	<5	<5	9	55	N/A	30
TSS	mg/L	<5	16	32	<5	34	107	N/A	50
BOD	mg/L	<2	9	16	<2	43	387	N/A	150



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.

Quarry Extension Discharge Monitoring

Analyte	Unit	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
		Min	Ave	Max	Min	Ave	Max		
pH	pH units	7.0	7.8	8.3	6.6	7.6	8.3	6.5 – 8.5	6.5 – 8.5
Turbidity	NTU	9.0	20.3	28.9	1.2	16.9	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. All results were also within the historical ranges of the analytes tested.

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 in July and August 2020 as well as March and May 2021. 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

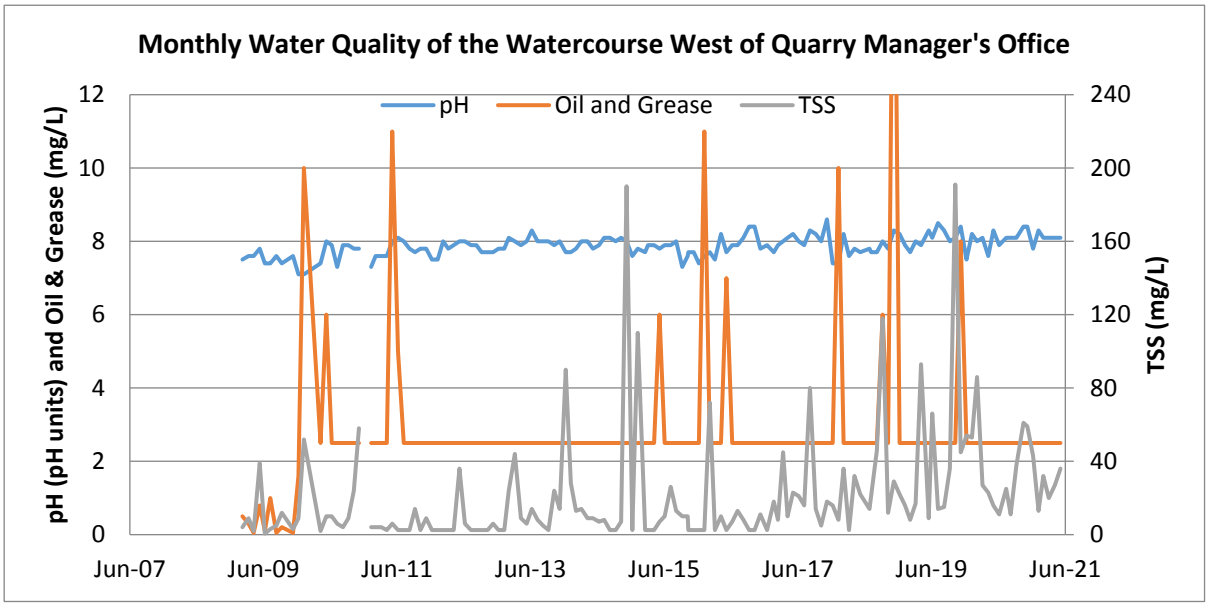
Rainfall runoff exceeded the capacity of the Main Holding Dam and overflowed on four occasions across five days during the reporting period. This dam is outside of the area covered by the Development Consent, however the EPL requires daily monitoring during any discharge from the dam. On two occasions across three days the EPL limit was exceeded for total suspended solids (TSS), with the exceedance reported to the EPA immediately once results were received from the laboratory. Each instance was investigated, and it was identified that on each occasion, significant rainfall (>100mm) fell in the days immediately preceding and during the dam overflows, with accumulated runoff exceeding the capacity of the dam in each instance. 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 was 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 6.7 and 8.8 pH units, while the TSS ranged between 18 and 157 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 monitoring are summarised below.

Analyte	Unit	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
		Min	Ave	Max	Min	Ave	Max		
pH	pH units	7.8	8.1	8.4	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	11	31	61	<1	20	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-20	0.024	70.5
Aug-20	No flow	185
Sep-20	No flow	No flow
Oct-20	0.034	No flow
Nov-20	No flow	No flow
Dec-20	No flow	No flow
Jan-21	No flow	No flow
Feb-21	No flow	No flow
Mar-21	No flow	20
Apr-21	No flow	No flow
May-21	No flow	65
Jun-21	No flow	15

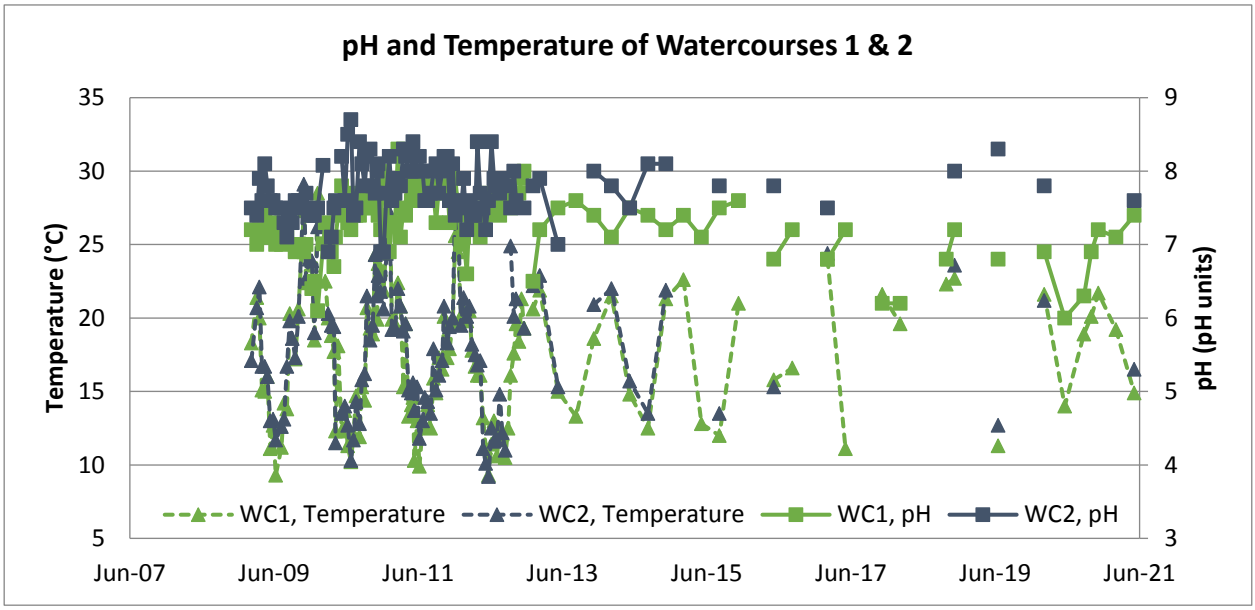
Flows monitoring indicates that flows in both watercourses have increased in the current reporting period compared with the previous period, which is reflective of the improved rainfall observed in the current year coming off the back of three years of below average rainfall. As the flow monitoring programme 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.

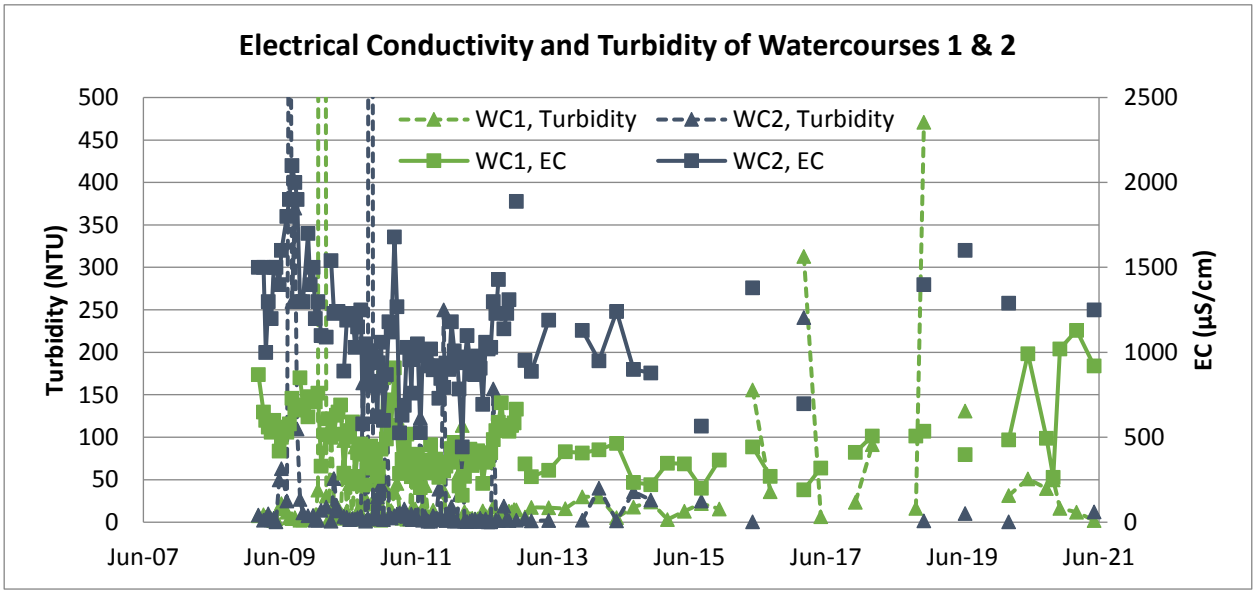
The EIS predicted that surface water flows in the watercourses may be affected by quarrying operations, with groundwater injection of captured water required if the rainforest vegetation associated with these watercourses showed signs of stress. Now that the catchment of Watercourse 1 has been consumed 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	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
pH units	Min	Ave	Max	Min	Ave	Max		
WC1	6.3	7.0	7.4	6.0	7.3	8.3	N/A	N/A
WC2	7.6	7.6	7.6	6.9	7.8	8.7	N/A	N/A
Temperature	**2020/21 Reporting Period**			**Historical Results**			**DC limit**	**EPL limit**
°C	Min	Ave	Max	Min	Ave	Max		
WC1	14.9	19.0	21.7	9.3	17.2	29.3	N/A	N/A
WC2	16.5	16.5	16.5	9.2	17.9	29.1	N/A	N/A
EC	**2020/21 Reporting Period**			**Historical Results**			**DC limit**	**EPL limit**
µS/cm	Min	Ave	Max	Min	Ave	Max		
WC1	265	766	1130	160	460	993	N/A	N/A
WC2	1250	1250	1250	443	1114	2100	N/A	N/A

Turbidity	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
NTU	Min	Ave	Max	Min	Ave	Max		
WC1	2.0	23.9	49.8	2.0	76.9	5890	N/A	N/A
WC2	12.3	12.3	12.3	0.5	82.1	5040	N/A	N/A





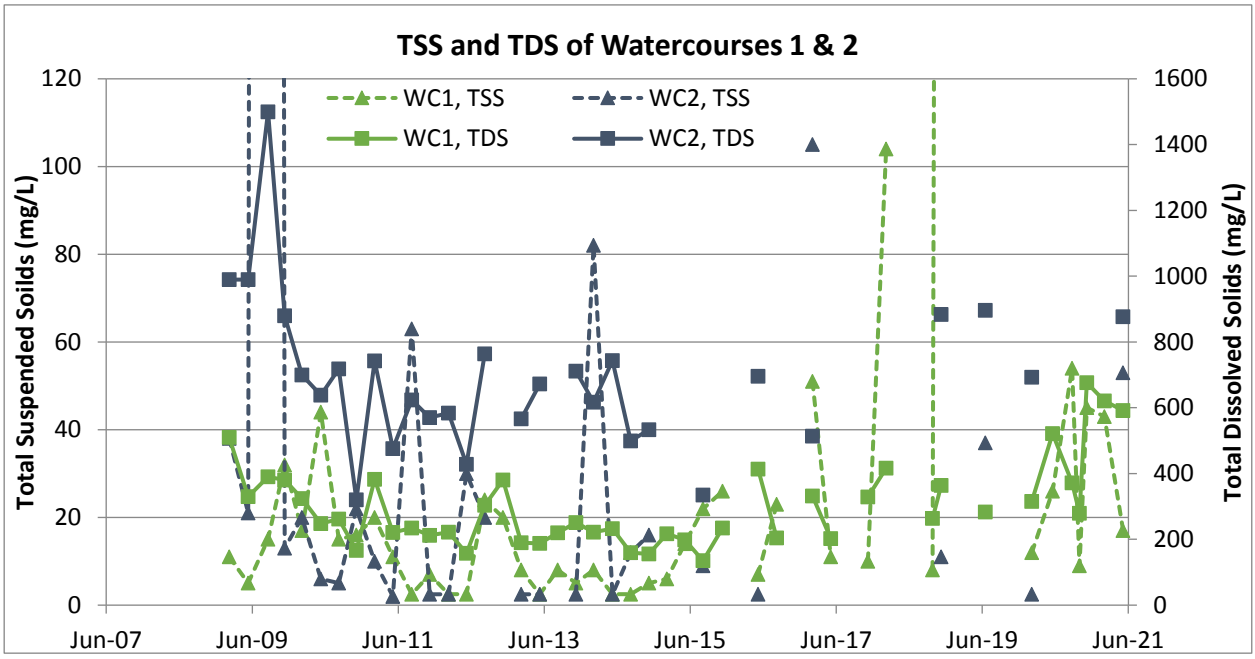
There was only sufficient water for sampling Watercourse 2 on one occasion in the current reporting period, while the sampling site for Watercourse 1 was moved a short distance downstream to a small on-stream farm dam, which allowed sampling of the standing water in the watercourse even during periods of no flow. This slight change in sampling location has meant the sample is now subject to evaporative concentration, which is seen in the higher electrical conductivity measurements in the current reporting period. Otherwise, all other field parameters were consistent with the historical results for each watercourse. While the lower data availability has made inferences harder than normal, these field observations correspond with EIS predictions, with no discernible impact on the water quality of these watercourses from the operation of the project predicted in the EIS.

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)

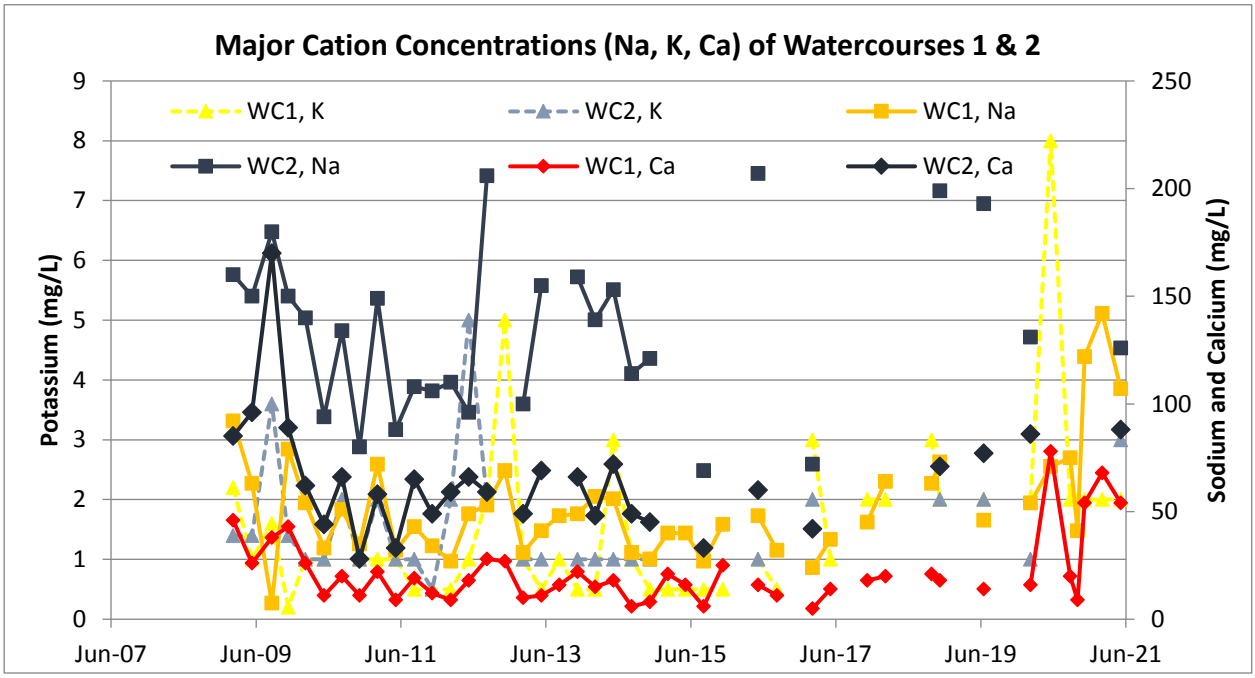
TDS	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	279	508	676	135	276	522	N/A	N/A
WC2	877	877	877	320	689	1500	N/A	N/A
TSS	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	9	34	54	3	38	699	N/A	N/A
WC2	53	53	53	2	112	2600	N/A	N/A



Concentrations of Total Dissolved Solids and Total Suspended Solids were within or consistent with the historical range for Watercourse 1 and Watercourse 2 during the reporting period with the exception of TDS for Watercourse 1, which was related to the location of the sampling point as described above under electrical conductivity. TDS results were in line with electrical conductivity results while TSS results were consistent with turbidity results, as is expected.

Major Cations (Sodium, Potassium, Calcium)

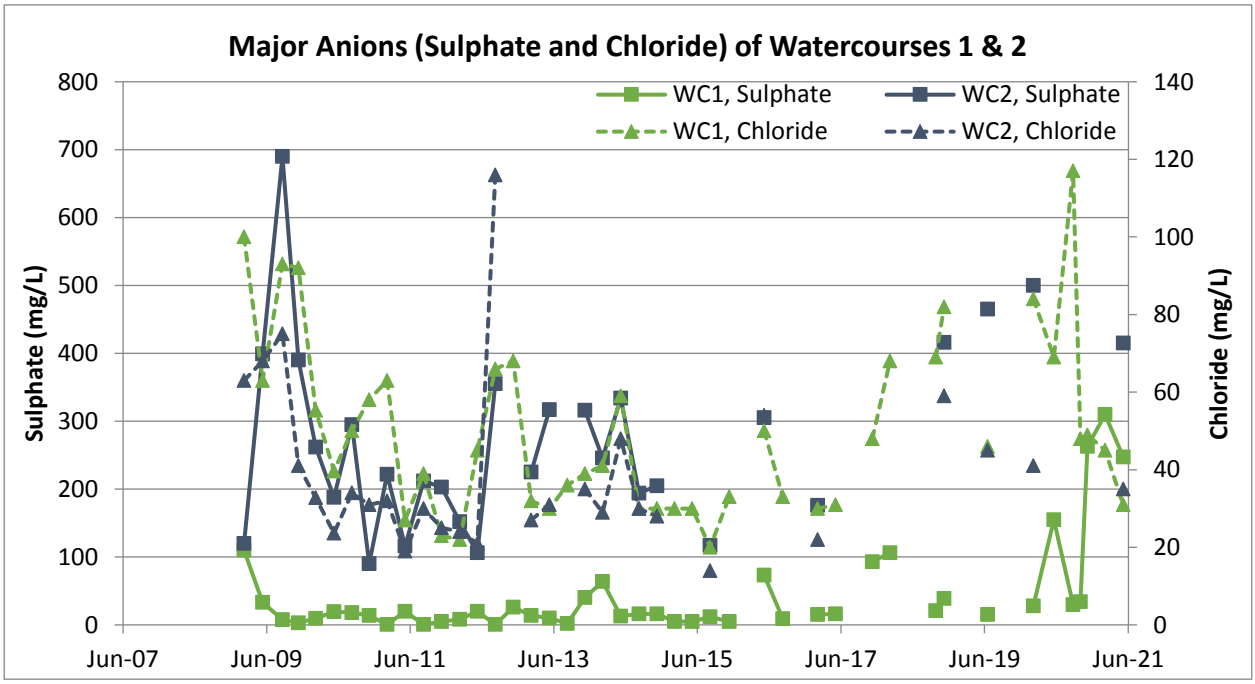
Sodium	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	41	97	142	7	47	92	N/A	N/A
WC2	126	126	126	69	134	207	N/A	N/A
Potassium	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	2	2	2	<1	1	8	N/A	N/A
WC2	3	3	3	<1	2	5	N/A	N/A
Calcium	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	9	41	68	5	20	78	N/A	N/A
WC2	88	88	88	28	64	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 sodium concentrations for Watercourse 1 which have mirrored the increased in salinity recorded at this site. The current monitoring suggests there has been no deterioration in surface water quality related to cation concentrations.

Major Anions (Chloride, Sulphate)

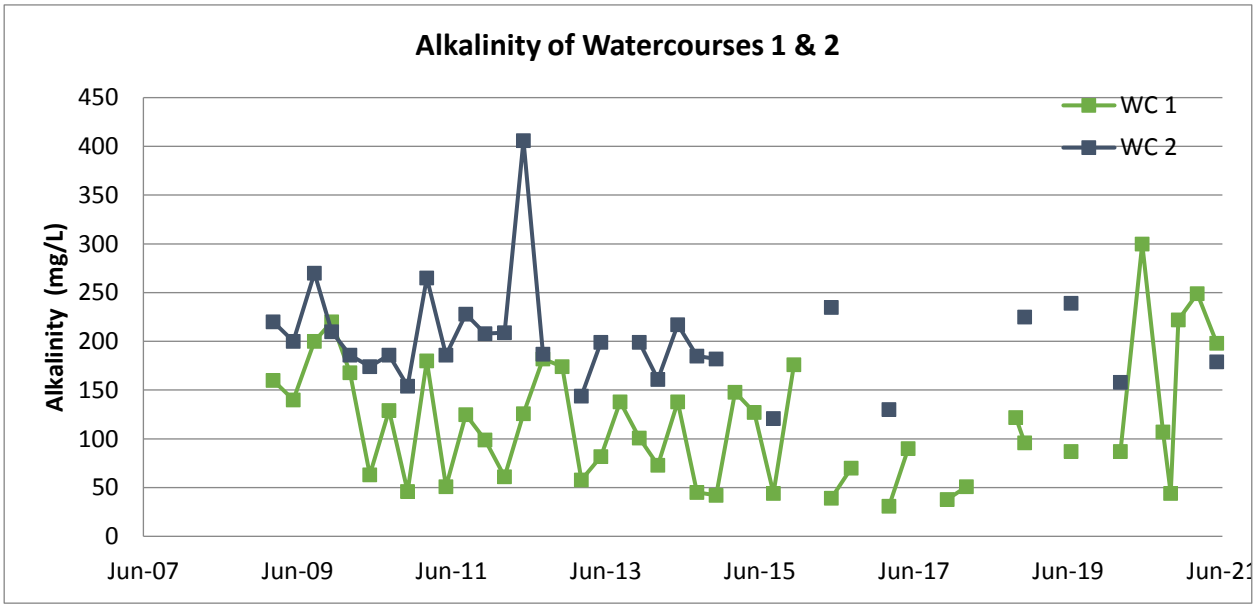
Sulphate	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	30	177	310	<1	27	155	N/A	N/A
WC2	415	415	415	90	272	690	N/A	N/A
Chloride	**2020/21 Reporting Period**			**Historical Results**			**DC limit**	**EPL limit**
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	31	58	117	20	49	100	N/A	N/A
WC2	35	35	35	14	39	116	N/A	N/A



Concentrations of sulphate and chloride have been recorded above the historical ranges for Watercourse 1 during the current reporting period, mirroring the increase observed in salinity attributed to the sampling location. Meanwhile, these major anions have remained within the historical ranges for Watercourse 2 during the current reporting period. All analytes have continued to exhibit their natural levels of variability 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

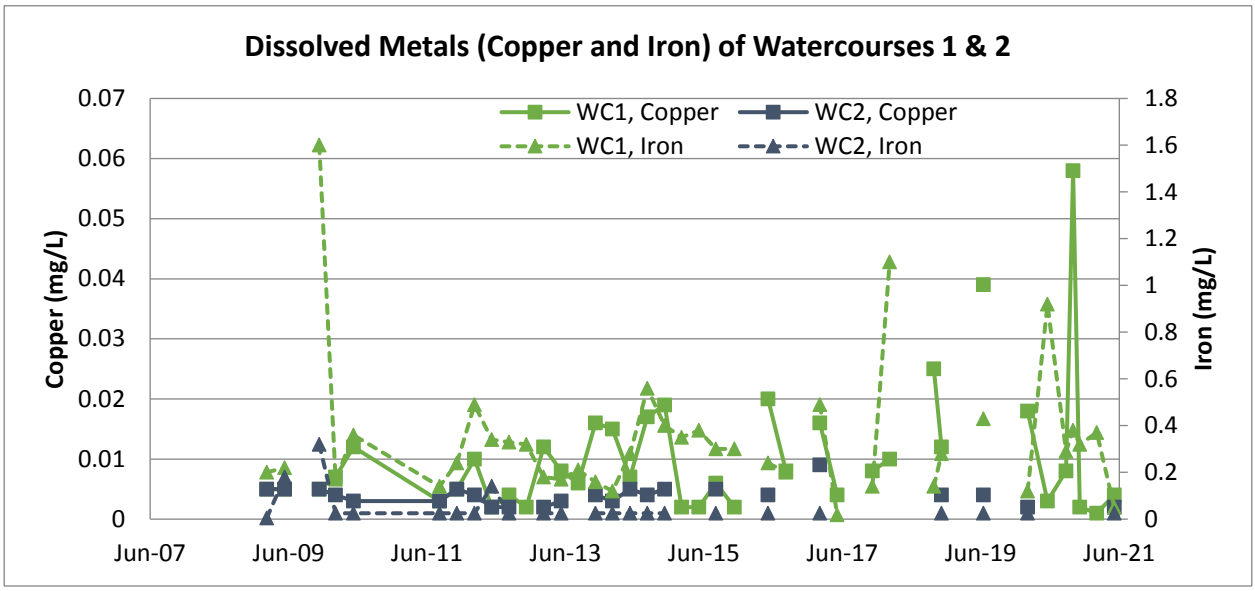
Alkalinity	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	44	164	249	31	110	300	N/A	N/A
WC2	179	179	179	121	203	406	N/A	N/A



Alkalinity levels in Watercourse 1 and Watercourse 2 were measured at concentrations in line with the historical range during the current reporting period. The observed levels of alkalinity are consistent with the natural variability over the historical period, and do not represent any deterioration in surface water quality of the watercourses.

Dissolved Metals (Copper, Iron)

Copper	2020/21 Reporting Period			Historical Results			DC limit	EPL limit
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	0.001	0.015	0.058	0.002	0.010	0.039	N/A	N/A
WC2	0.002	0.002	0.002	0.002	0.004	0.009	N/A	N/A
Iron	**2020/21 Reporting Period**			**Historical Results**			**DC limit**	**EPL limit**
mg/L	Min	Ave	Max	Min	Ave	Max		
WC1	0.050	0.282	0.380	0.019	0.350	1.600	N/A	N/A
WC2	<0.05	<0.05	<0.05	<0.01	0.049	0.320	N/A	N/A



Concentrations of dissolved metals in Watercourse 1 and Watercourse 2 have followed historical trends in the current reporting period, consistent with the natural variability of the watercourses. One sample for copper was recorded above the historical range for Watercourse 1, returning to very low levels in the following period. The extended metals suite (arsenic, cadmium, chromium, lead, mercury, nickel, zinc) was tested twice in the current reporting period for Watercourse 1 due to electrical conductivity measurements in the watercourse above 1000 µS/cm. On each occasion, each metal species was recorded below the standard laboratory reporting level, with the exception of zinc, which is naturally present in the groundwater as previously discussed. As such, the concentrations of dissolved metals in the watercourses in the current report period do not represent any deterioration in water quality, as predicted in the EIS.

3.3.4 Surface Water Monitoring Results Interpretation

Surface water flows have increased in the current reporting period with the improved rainfall conditions, albeit from a very low base coming off three years of significant rainfall deficits. Flows at the monitoring point on Watercourse 1 have also 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 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. This has led to the minor increases in salinity and major ion concentration in this watercourse since June 2020.

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 approximately 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. While there was no flow on four of the five sampling periods, the results of sampling in the fifth and most recent period (June 2021) demonstrates that there has been no deterioration in water quality in Watercourse 2, consistent with EIS predictions.

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 Programme 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	2020/21 Reporting Period			Historical Results			EIS Average Prediction
	Min	Ave	Max	Min	Ave	Max	
APD 1	1.5	9.5	26.2	0.1	4.5	26.8	<= 2.6
APD 2	0.5	2.4	7.6	0.1	2.5	12.6	<= 3.5
APD 3	0.2	1.3	3.0	0.1	1.5	8.6	<= 2.2
APD 4	0.5	2.4	7.7	0.1	2.1	13.3	<= 3.2

PM_{10}

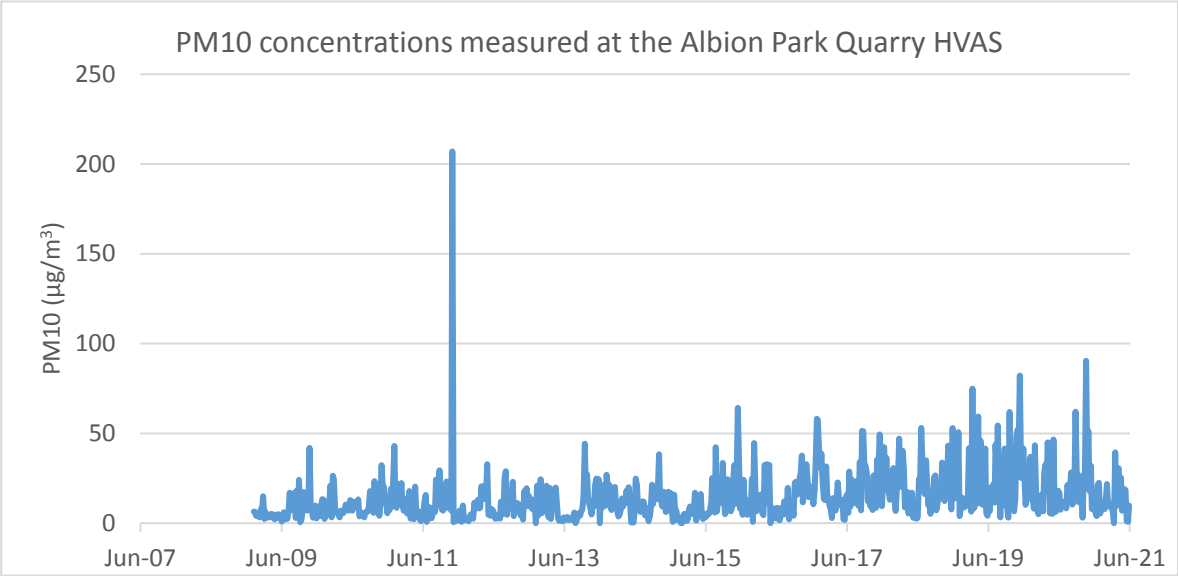
The following table provides a summary of PM_{10} concentrations ($\mu g/m^3$) for the High Volume Air Sampler at the Albion Park Quarry, with the following graph showing the historical trend in PM_{10} concentrations.

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}	2019/20 Reporting Period				Historical Results			EIS Average Prediction
	Min	Ave	Incr. max	Max	Min	Ave	Max	
HVAS#	0.8	18.0	52.6	90.4	0.0	14.3	207.0	< 25
DC criteria		30	50*					

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), while the fourth gauge is located at the entrance to the site, and has experienced significant dust contributions from the Albion Park Rail bypass project, which involves the construction of a new motorway. The motorway construction has involved extensive earthworks directly adjacent to the gauge for the entirety of the reporting period. 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 attributable to the Albion Park Quarry, nor dust deposition in the sensitive receivers to the north of the site. Contributions from the motorway construction are expected to decline over the next year, which will likely lead to reduced levels of deposited dust at this monitoring point. Depositional dust levels in all gauges have decreased from the previous reporting period due to reduced regional contributions from dust storms and ash fallout that affected the previous years readings.

The results above show that development consent limit related to annual average PM_{10} was met during the current reporting period. On three occasions, the total PM_{10} concentrations measured at the High Volume Air Sampler located at the project-related Belmont homestead were greater than the 50 µg/m³ daily trigger related to incremental increases from the project. On these occasions the levels of PM_{10} measured at the monitor ranged between 51.3 and 90.4 µg/m³. The NSW Government Office of Environment and Heritage (OEH) operate Tapered Element Oscillating Microbalances (TEOMs) at three sites in the Illawarra, which measure PM_{10} concentrations in real time. These OEH monitors provides a suitable background (based on the average of the units) on which to assess the project's incremental impact. On these three days, the OEH monitors recorded average PM_{10} concentrations between 11.6 and 37.8 µg/m³. This allows a determination of the incremental impact of the Albion Park Quarry of between 21.0 µg/m³ and 52.6 µg/m³ on these days. On two of these occasions, the incremental impact of the Albion Park Quarry was greater than the DC trigger for daily incremental impact of 50 µg/m³, with incremental impacts of 50.4 µg/m³ and 52.6 µg/m³ on these days. The Department was notified of these exceedances, and investigations undertaken into each event, which is further described in Section 7 of this report.

Average PM_{10} concentrations for the current reporting period have reduced significantly from the previous reporting period, from 23.7 µg/m^3 to 18.0 µg/m^3. This reduction can be principally attributed to improvements in regional air quality, with the previous period adversely affected by an extended drought, occasional dust storms, and a long period of bushfire smoke associated with the notorious 2019-20 bushfire season. With improved rainfall since February 2020, regional air quality has improved considerably leading to the reduced average particulate matter levels in the current reporting period. The current year average of 18.0 µg/m^3 remains above the historical average for the site of 14.3 µg/m^3, which can be attributable to the close proximity of quarry activities from the current monitor, and is likely to represent highly localised impacts within the immediate quarry environment rather than any significant change in offsite impacts. Overall the average annual PM_{10} levels represent *very good* air quality in the vicinity of the quarry, as per the NSW Office of Environment and Heritage's Air Quality Index values, notwithstanding the fact that the OEH monitors recorded *hazardous* regional air quality at times during the reporting period, due to the particulate matter generated by bushfires in the surrounding regions.

As part of Modification 3 of the DC, Cleary Bros committed to establishing real-time particulate monitors at three locations around the site. During the second half of the period, Cleary Bros has trialled the use of the alerting function of these monitors to provide a real time response to elevated particulate matter concentrations. This has assisted with the reduction in PM_{10} measured in the 2nd half of the reporting year, from 22.5 µg/m^3 from July to December 2020, to 13.5 µg/m^3 from January to June 2021. 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, 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 13 days across July and August 2020. 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 July and August 2020. 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	2020 results	Criteria (stages 5-6)	EIS Prediction	2019 results	2018 results
The Cottage	34	35	N/A	33	30
The Hill	35	35	33	31	27
Greenmeadows Estate	41	41	41	41	36

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(Lin 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 2020-2021 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	2020/21 Reporting Period					Historical Results		
	# blasts	Average	95th %	# > 95th %	Max	Average	95th %	Max
Overpressure (dbL)	35	107.2	112.3	0	114.8	103.5	111.0	115.6
DC limits			115		120			
EIS Prediction			< 115				< 115	
Vibration (mm/s)	35	2.33	4.46	1	7.39	1.60	3.57	4.74
DC limits			5		10			
EIS Prediction			< 5				< 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 114.8 dB(L), below the DC/EPL lower criteria and EIS prediction of up to 115 dB(L). Of the 35 blasts undertaken during the reporting period, one blast, representing 2.9% of blasts in the period, recorded a vibration above the 95% DC criteria of 5 mm/s. This blast recorded a vibration of 7.39mm/s, with no blasts above the maximum permissible level of 10mm/s. As such, the vibration DC criteria was met during the reporting period. The average, 95th percentile, and maximum air overpressure and vibration have generally been higher in the current reporting period than the historical average, reflecting blasting in closer proximity to the monitor during the current reporting period. However average vibration and overpressure emissions are generally consistent with the previous reporting period. 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 the establishment of vegetation in zones 4 and 5 of the rehabilitation areas. Zone 5 was planted out during the current period following good winter rainfall in 2020 and the erection of the pest-proof fence in the previous period. 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.

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 eleven permanent survey plots were surveyed this year as part of the annual survey, with two additional plots across Zone 4 and 5 established and surveyed in this period.

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*	Single plant observed within plot 5
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

Common Name	Botanical Name	Condition
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

150 plants were installed during the current reporting period in Zone 5, with 40 different species planted. The full list of species planted is included in Appendix D. The principle rainforest species planted include:

- *Acmena smithii* (Lilly Pilly)
- *Diploglottis australis* (Native Tamarind)
- *Myoporum acuminatum* (Boobialla)
- *Myrsine variabilis* (Muttonwood)
- *Podocarpus elatus* (Plum Pine)
- *Synoum glandulosum* (Scentless Rosewood)

Zone 3, which was replanted in 2017 following significant dieback, has responded particularly well to the improved rainfall in the past year as shown by the following photo taken from the eastern end of this zone in April 2021. The growing canopy is now starting to restrict the growth of annual weeds in this zone.

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 2021-22:

- Treatment of Lantana working from areas of good bush toward the more weed infested areas within all but the planted zones.
- Treatment of Madiera Vine to control further spread of this highly invasive weed.
- Continued fencing maintenance to exclude goats and allow further establishment of the planted areas.
- Continued revegetation maintenance around plantings to assist canopy establishment to eventually exclude annual weeds and grasses.
- Maintain planting within Zone 5 compound with a range of grassy woodland and rainforest canopy species.

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

Three environmental complaints were received during the current reporting period, with two relating to blast noise and vibration, and the third relating to loose material on the East West Link adjacent to the quarry entrance. 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

Year	Environmental Complaints
2014/2015	5
2015/2016	2
2016/2017	7
2017/2018	6
2018/2019	3
2019/2020	14
2020/2021	3

4.3 Environmental Complaints Results Interpretation

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

Date	Description of Complaint	Status
26 August 2020	Complainant stated that blast 23/20 caused excessive shaking to house. Noise and vibration levels within approved limits.	Closed out
3 March 2021	Complainant stated that noise and vibration from blast 7/21 was excessive. Noise and vibration levels within approved limits.	Closed out
3 June 2021	Complainant stated that there was loose material on the East West Link road outside of quarry entrance. Street sweeper already engaged along East West Link at time complaint was received.	Closed out

Cleary Bros operates a Community Consultative Committee (CCC) for the Albion Park Quarry. Two 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. These meetings were held virtually through Zoom to minimise risk associated with the Covid-19 pandemic and to comply with government requirements.

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 DP&E 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 DP&E 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 DP&E 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 DP&E 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 DP&E 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 DP&E 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 trialled the use of the alerting function of these monitors to provide a real time response to elevated particulate matter concentrations. This has assisted with the reduction in PM_{10} measured in the 2nd half of the reporting year, from 22.5 µg/m^3 from July to December 2020, to 13.5 µg/m^3 from January to June 2021. 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 DP&E 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 DP&E. 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, considering one complaint received during the reporting period related to transport at the Albion Park Quarry.

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

As required by the Condition 6 of Schedule 5 of the DC, Cleary Bros commissioned ERM to carry out an Independent Environmental Audit. The audit was completed by ERM 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

Two non-compliances with the conditions of the Development Consent were identified during the reporting period, relating to PM_{10} concentrations recorded at the High Volume Air Sampler located adjacent to the Belmont homestead. Both instances were investigated and related to instances of material stripping in very close proximity to the monitor (less than 60m), and as such provide a highly conservative measure of the impact to surrounding air quality. In each case, the incremental PM_{10} criteria of 50 µg/m^3 was exceeded by no more than 2.6 µg/m^3, representing a marginal exceedance of the criteria in each case. Furthermore, the annual average PM_{10} measurement for reporting period has dropped significantly from the previous reporting period, from 23.7 µg/m^3 in 2019/20 to 18.0 µg/m^3 in 2020/2021.

Nevertheless, in response to these non-compliances, Cleary Bros has undertaken further training of all quarry workers to ensure a prompt response to adverse weather changes.

8. CONCLUSIONS

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 Development Consent, and two non-compliances with the conditions of the EPL. In each case, these exceedances have been investigated, and additional strategies implemented to reduce the risk of further non-compliances. 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 as the region emerges from the significant drought of the previous years. 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 excellent growth seen in those areas planted only four 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 – 2019-2020

Extractive Materials Return 2019-2020

Regional NSW

Form S1 – Period Ending 30 June 2020

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, RESOURCE PLANNING & PROJECTS, DEPARTMENT OF REGIONAL NSW, PO BOX 344 HUNTER REGION MAIL CENTRE NSW 2310 on or before 31 October 2020**. 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, Resource Planning & Projects

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

Typical Geology: Basalt 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) _____

From Crown Lands or other NSW Department _____

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** 25/9/20
- **CONTACT PERSON for this return**
- **NAME** (Block letters) **Telephone**

Extractive Materials Return 2019-2020

NSW GOVERNMENT | Regional NSW

Form S1 – Period Ending 30 June 2020

Sales During 2019-2020

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**	**77,039**
Over 30mm to 75mm	**70mm crushed rock, rock fill, ballast**	**96,615**
5mm to 30mm	**20mm, 14mm, 10mm, 7mm, 5mm aggregates and blends**	**309,618**
Under 5mm	**Crusher dust and related products, bedding sand**	**142,967**
Natural Sand		**0**
Manufactured Sand	**Manufacture Sand**	**8,321**
Prepared Road Base & Sub Base	**DGB, DGS, SMZ**	**183,171**
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	**Enviropave**	**23,298**
Other Unprocessed Materials		**0**
River Gravel		
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)	**0**
TOTAL SITE PRODUCTION		**841,029**
Gross Value ($) of all Sales		
Type of Material	**Basalt 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.

Annexure B

Environmental Monitoring Locations

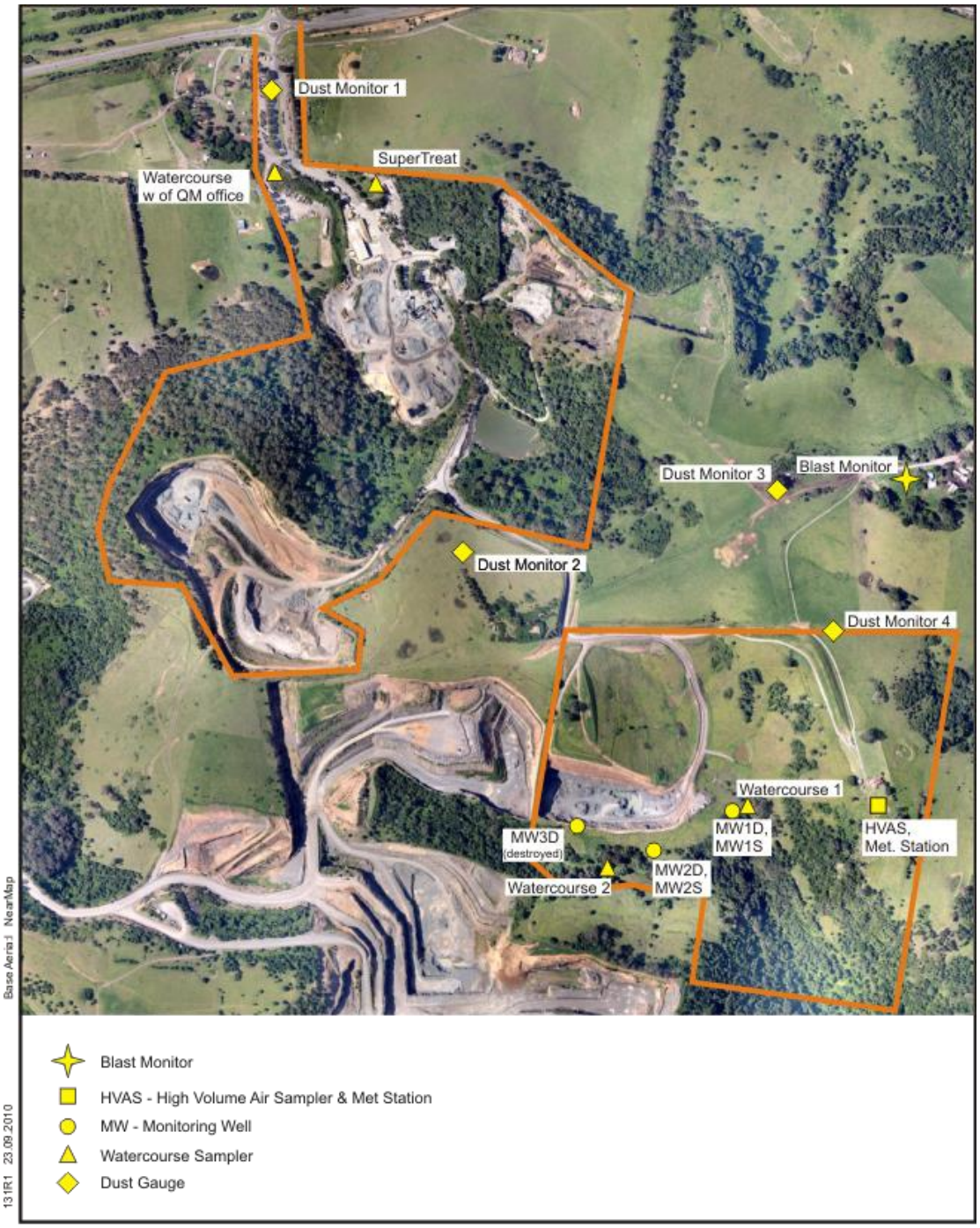


FIGURE 3 Monitoring Locations

Annexure C

Biannual Ecological and Rehabilitation Monitoring

Good Bush Pty Ltd – December 2020

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 2nd December 2020.

Yours Sincerely

Marcus Burgess

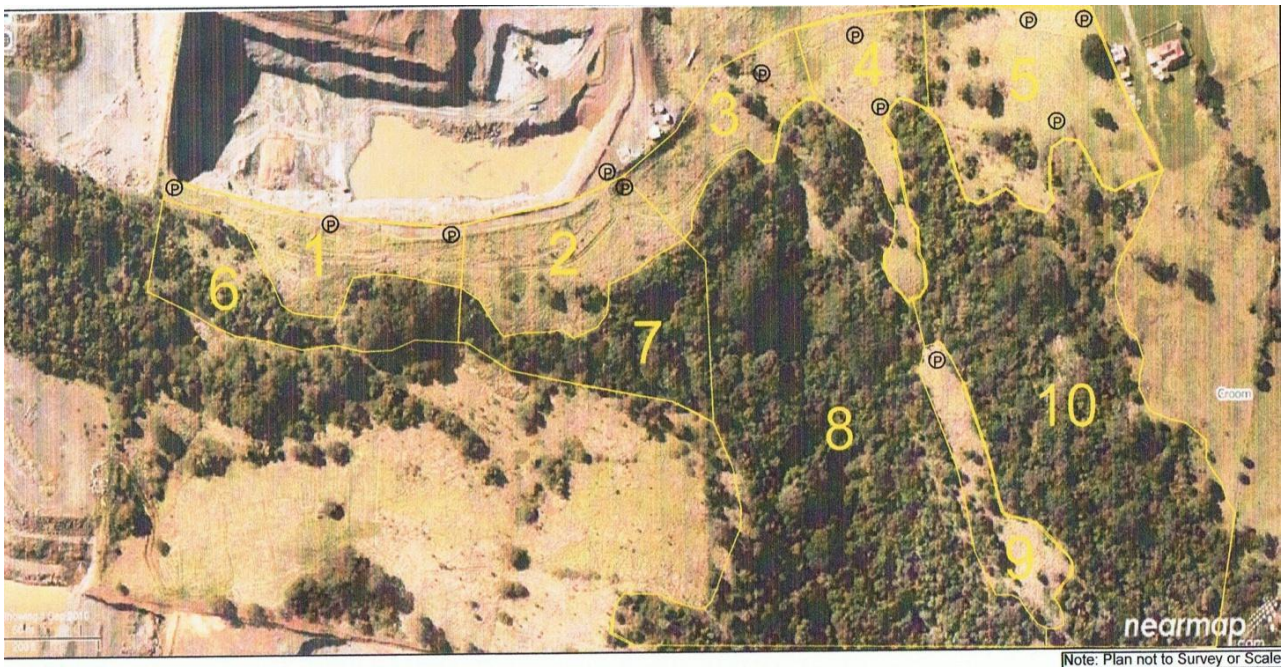
Manager – Good Bush Pty Ltd Natural Area Restoration

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 2nd December 2020 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
- Installation of plant protection guards using recyclable chicken wire and hardwood stakes to minimise grazing
- 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 edge. A small number of trees were installed within Zone 4 in Winter 2019 with minimal success. Fencing has been recently installed on the northern edges of these zones and the Zone 4 compound was planted in March 2020.

Completed Works

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

- Planting 300 various rainforest trees within the Zone 5 compound
- Installation of rigid chicken wire plant guards to minimise herbivory
- Treatment of woody weeds and ascending vines within Zone 4 and 5 fenced compounds
- Primary weed control within a small rainforest remnant within Zone 5 covering approximately 300m²
- Identification of a new population of the threatened species White Wax Flower (*Cynanchum elegans*) within the rainforest remnant in Zone 5
- Treatment of WoNS (Weed of National Significance) African Boxthorn (*Lycium ferocissimum*) using the cut and paint method
- Frilling of African Olive and Privet wthin 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

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

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.

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 on the ecotone between rainforest and woodland communities covering approximately 300m²

Recommendations

The following management actions will be required within this zone:

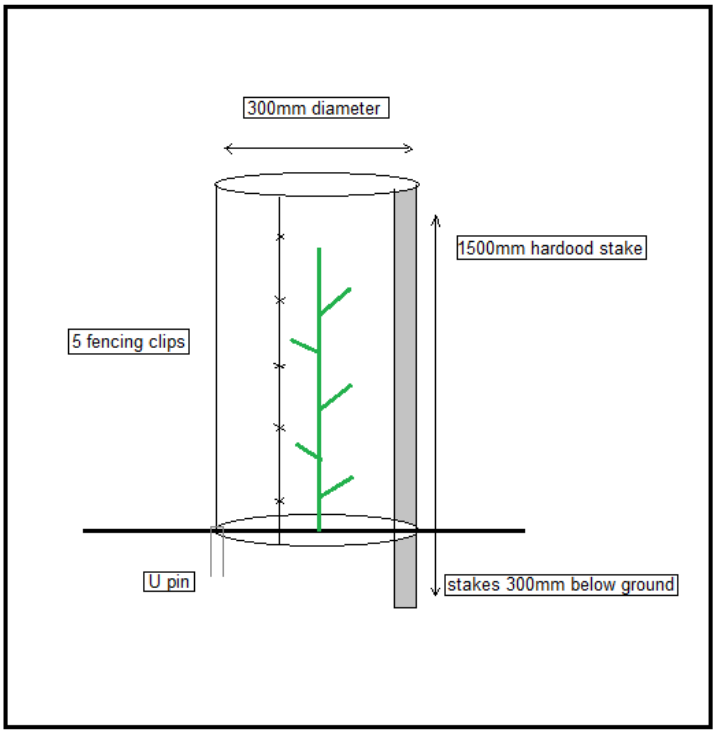
- Treatment of woody weed incursions within the established canopy areas and around the perimeter of the woodland and rainforest remnants
- Assisted regeneration to assist expansion of the rainforest remnants
- Monitoring for Madiera Vine populations that have been spread by floating tubers from Zones 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. As conditions have been very dry lately macropod grazing has become very opportunistic and species such as Fleabane that these animals would not usually graze is showing signs of grazing throughout the site.

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 will 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:



Revegetation Species List

The following list the plant species and numbers planted over the past six months. All plants were supplied by Carl Glaister from locally sourced seed and grown at this residential property in Kiama Downs.

Botanical Name	Number Planted
Acmena smithii	16
Acronychia oblongifolia	5
Alcornea illicifolia	2
Alectryon subcinereus	13
Alphitonia excelsa	1
Backhousia myrtifolia	10
Baloghia inophylla	17
Brachychiton acerifolius	11
Clerodendrum tomentosum	1
Cryptocarya glaucescens	4
Deeringia amaranthoides	3
Diospyros australis	5
Diploglottis australis	13
Ehretia acuminata	2
Elaeodendron australe	2
Emmenosperma alphitiniodes	3
Ficus coronata	2
Ficus macrophylla	5
Ficus obliqua	1
Ficus rubiginosa	5
Ficus superba	4
Geijera latafolia	1
Glochidion ferdinandii	3
Gmelina leichardtii	16
Gossia acmeniodes	3
Guioa semiglauca	1
Hedycarya angustifolia	1
Homalanthus populifolius	5
Homalanthus stillingifolius	1
Litsea reticulata	5
Melia azedarach	5
Myoporum acuminatum	10
Myrsine variabilis	20
Notelaea venosa	1
Parachidendron pruinosum	7
Pennantia cunninghamiana	1
Pissonia umbellifera	7
Pittosporum revolutum	4
Pittosporum undulatum	9
Planchonella australis	10
Podocarpus elatus	18
Polyscias elegans	2
Sarcomelicope simplicifolia	1

Senna acclinis	2
Solanum aviculare	5
Stenocarpus salignus	11
Streblus brunonianus	4
Synoum glandulosum	12
Syzigium australe	4
Trema tomentosa var.aspera	5
Wilkiea huegeliana	2
TOTAL	300

Threatened species register

Family	APOCYNACEAE
Common Name	White Wax Flower
Genus / Species	*Cynanchum elegans*
Date	3/09/2020
Site Description	Cleary Bros APQ
GPS Co-ordinates	Lat: -34.58853055 Long: 150.82441865 E: 300468.756 N: 6170434.687
Datum	WGS 84
GPS Accuracy	+ - 7 metres
Number of Plants / Stems	Approximately 5- 10 mature stems and many suckers present
Size / Age of Plants	Mature vines and many suckers
Vegetation Community	Illawarra Dry Subtropical Rainforest
Growing in association with	Growing in association with *Scolopia, Notelaea, Guoia, Elaeodendron,*

Photographs

Zone 1 planting area after cage maintenance

Regeneration of Cutleaf Cranesbill (*Geranium solanderi*) within Zone 2

Zone 2 revegetation area showing plant establishment

Zone 2 revegetation area showing plant establishment

Zone 5 rainforest remnant prior to primary weed control

Installation of plant protection cages within Zone 5

Zone 5 planting compound during construction of plant protection cages

Zone 8 primary weed control area on the ecotone between woodland and rainforest

Pigeonberry Ash (*Elaeocarpus kirtonii*) with new growth in Zone 8

Botany Bay Weevils (*Chrysolopus spectabilis*) commonly found on Wattles during early summer

Annexure D

Annual Ecological and Rehabilitation Monitoring

Good Bush Pty Ltd – June 2021

2021

Albion Park Quarry Annual Monitoring Report

AUTHOR:

MARCUS BURGESS AND TANITA GORDON

DATE:

SURVEY PLOT: 23 JUNE 2021

REPORT: 9TH JULY 2021

Contents

Introduction

Good Bush Pty Ltd were engaged by Cleary Bros (Bombo) 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 objectives 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 to report on the progress in implementing the above conditions. The latest site inspections and surveys were carried out on 2nd July 2020 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 West 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*	Single plant observed within plot 5
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

Threatened Species

One additional threatened plant species was identified within Zone 5. Below is the threatened species register for this particular plant:

Common Name	White Wax Flower
Genus / Species	*Cynanchum elegans*
Identified by	Marcus Burgess
Date	20/10/2020
Site Description	Within dry rainforest remnant in the middle of fenced management zone 5 and monitoring point 5
Datum	Aus Geod 84
Accuracy	+ - 7 metres
Elevation	115 metres
GPS Co-ordinates (UTM)	Northing: 6170435 Easting: 0300466
Number of Plants / Stems	1
Size / Age of Plants	Single mature stem with many branches and a number of suckers
Growing in association with	Flintwood (*Scolopia braunii*), Cosckspur Thorn (Maclura cochinchinensis)

White Wax Flower (Cynanchum elegans) example photo

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.

Zones 1, 2 and 3

Woody weed control works and treatment of ascending vines have been carried out within this zone since the previous Biannual report. Maintenance of plant protection cages has also been ongoing within Zone 1.

Zones 4 and 5

These zones have the majority of works over the past 12 months. Large scale Lantana removal was carried out adjacent to the rainforest remnant in Zone 5 and during these works the Population of the threatened species White Wax Flower (*Cynanchum elegans*) was observed and recorded. Planting has been carried out within both of these zones with varying success.

Zone 6 and 7

No works have been carried out within these zones with exception to removal of woody weeds and spraying Rhodes Grass to provide access to a water quality monitoring point as requested by CB staff.

Zones 8 and 9

Primary weed control works have commenced within both of these zones to treat woody weeds such as Lantana and African Olive.

Zone 10

No works have been carried out within this zone.

Condition of Fencing

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 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 2020 and July 2021:

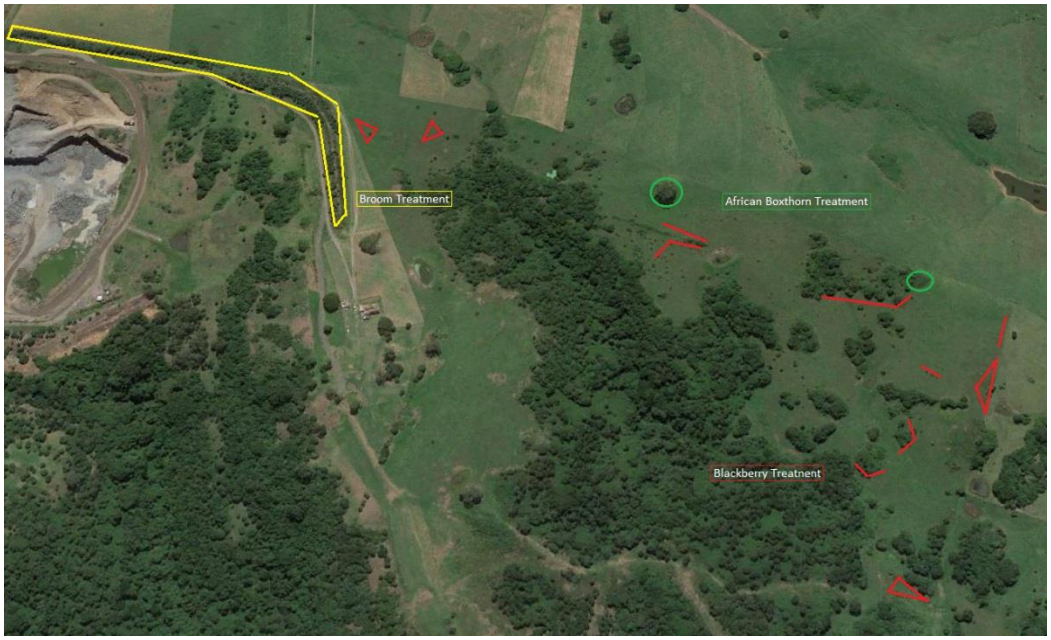
	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	TOTAL
Planting Hours					20								20
Weed Control Hours			74		22		70 (IDWA)		63 (31 IDWA)		52	28	309
Number of Plants Installed					150								150
Other			24 (water, caging)		7 (water)	70 (caging)					2 (track-work)	14 (report)	117
Feral animal control													

Planting Records

The following plants and numbers were installed this year:

Acmena smithii	10
Acronychia oblongifolia	3
Alcornea illicifolia	1
Alectryon subcinereus	9
Brachychiton acerifolius	1
Baloghia inophylla	7
Cryptocarya glaucescens	3
Deeringia amaranthoides	3
Diospyros australis	3
Diploglottis australis	10
Ehretia acuminata	1
Emmenosperma alphitiniodes	1
Ficus coronata	2
Ficus macrophylla	3
Ficus obliqua	1
Ficus rubiginosa	1
Ficus superba	3
Glochidion ferdinandii	1
Gmelina leichardtii	7
Gossia acmeniodes	1
Homalanthus populifolius	1
Homalanthus stillingifolius	1
Litsea reticulata	1
Melia azedarach	3
Myoporum acuminatum	10
Myrsine variabilis	10
Parachidendron pruinosum	5
Pennantia cunninghamiana	1
Pissonia umbellifera	5
Pittosporum revolutum	2
Pittosporum undulatum	4
Planchonella australis	8
Podocarpus elatus	10
Polyscias elegans	1
Senna acclinis	1
Solanum aviculare	3
Stenocarpus salignus	2
Streblus brunonianus	1
Synoum glandulosum	10
Trema tomentosa var.aspera	1
TOTAL	150

IDWA (Illawarra District Weeds Authority) Required Weed Control



Illawarra District Weeds Authority (IDWA) weed control works were conducted in the vegetated bund and paddocks surrounding the Belmont Property (see map above) as per the directive of David Pomery with the IDWA.

The directed targets included the following species Cape Broom (*Genista monspessulana),* African Olive (*Lycium ferocissimum)* and Blackberry *(Rubus fruticosus).* These weeds were treated using the following method:

Cut and Paint

The Cut and Paint removal technique involves the cutting of the stem using loppers and saws as low to the ground as possible and immediately applying undiluted Glyphosate to the cut stump. Weeds treated using this technique include Cape Broom and African Olive. This treatment is preferable to hand removal due to reduced soil disturbance and erosion.

Frilling

Frilling of trees will be utilised when there is too much material for disposal or to retain habitat. The frilling technique involves using a chisel to cut at 30mm intervals around the base of the trunk and the application of undiluted Glyphosate to the cut. Used for larger specimen of African Olive.

Herbicide Application – Foliar Spray

Use of herbicides will be limited to the use of Round Up Biactive® and Metsulfuron spraying activities will utilised after careful inspection of spray areas to ensure no naturally occurring species are targeted and include foliar spraying.

Recommendations

The following recommendations are made following the 2021 inspections:

- Treatment of Lantana working from areas of good bush toward the more weed infested areas within all but the planted zones
- Treatment of Madiera Vine to control further spread of this highly invasive weed
- Continued fencing maintenance to exclude goats and allow further establishment of the planted areas
- Continued revegetation maintenance around plantings to assist canopy establishment to eventually exclude annual weeds and grasses
- Maintain planting within Zone 5 compound with a range of grassy woodland and rainforest canopy species

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 for priority for removal as legislated and based on their invasive potential:

Botanical Name / Common Name	**Control Methods**
Madiera 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

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

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 usitattus	U	<5%	*Phytolacca octandra*	O	5%
Dichondra repens	U	<5%	*Brassica sp.*	O	5%
Oplismenis 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*

Plot 1 SW corner photo

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 usitattus	U	<5%	*Cenchrus clandestinus*	C	10%
Dichondra repens	U	<5%	*Bidens pilosa*	C	15%
Oplismenis aemulus	U	<5%	*Gomphcarpus fruticosis*	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 olearaceous	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*

Plot 2 NE corner photo

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%
			Gomphcarpus fruticosis	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*

Plot 3 NE corner photo

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 subcinireus	C	<5%			
Notelea venosa	C	<5%			
Croton verauxii	O	<5%			
Melicytus dentatus	O	<5%			
Alphitonia excelsa	I	10%			
Alchornea ilicifolia	O	<5%			
Geijera salicifolia	I	10%			
Clerodendrum tomentosa	O	<5%			
Eustrephus latifolius	C	<5%			
Nyssanthes erecta	C	<5%			
Maclura cochinchinensis	C	<5%			
Oplismenis imbecillis	C	<5%			
Pseuderanthemum variabile	C	<5%			
Stellaria flaccida	O	<5%			
Getonoplesium 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

Plot 6.1 NE corner photo

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%	*Circium vulgare*	U	<5%
Croton verauxii	O	<5%	*Phyllanthus tenellus*	U	<5%
Geitonoplesium cymosum	C	<5%	*Solanum mauritianum*	U	5%
Clerodendrum tomentosa	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

Plot 6.2 NE corner photo

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.	**Abundance**	**% Cover**	**Botanical Name Weed Sp.**	**Abundance**	**% Cover**
Acacia maidenii	U	<5%	*Olea eurpaea*	U	10%
Guoia 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 tomentosa	I	<5%	*Solanum mauritianum*	U	<5%
Disopyros pentemera	I	<5%	*Chloris gayana*	C	10%
Streblus brunonianus	C	<5%	*Senecio madagascariensis*	O	<5%
Pandorea pandorana	C	25%			
Adiantum formosum	C	30%			
Oplismenis aemulus	C	15%			
Pellea falcata	C	<5%			
Geitonoplesium cymosum	C	<5%			
Abutilon oxycarpum	C	15%			
Dichondra repens	C	<5%			
Poa labilardieri	O	<5%			
Breynia oblongofolia	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%			
Plectanthus parvifolius	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

Plot 8.1 NE corner photo

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 subcinireus	C	<5%			
Elaodendron australe	C	<5%			
Diploglottis australis	I	<5%			
Parachidendron 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%
Guoia 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 verauxii	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

Plot 8.2 NW corner Photo

Plot 8.2 survey point

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%			
Notelea venosa	U	<5%	*Araujia sericifera*	O	5%
Carex longebrachiata	C	<5%	*Senecio madagascariensis*	O	5%
			Cirsium vulgare	O	5%
			Conyza sumatrensis	O	5%

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

Plot 8.3 NE corner photo

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%
Guoia 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 madagascarensis*	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*

Plot 9 NW corner photo

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.	**Abundance**	**% 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%
Pellea falcata	O	<5%	*Senecio madagascarensis*	U	<5%
Asplenium flabellifolium	O	<5%	*Tagetes minuta*	U	<5%
Aphaneopetalum resinosum	C	10%	*Solanum mauritianum*	U	<5%
Cissus antarctica	O	10%	*Sonchus olearaceus*	U	<5%
Notelea venosa	U	10%	*Phytolacca octandra*	O	5%
Clerodendrum tomentosa	O	<5%	*Cirsium vulgare*	U	<5%
Eustrephus latifolius	C	<5%	*Conyza sumatrensis*	U	<5%
Oplismenis aemulus	O	<5%	*Solanum linnaeanum*	I	1%
Plectranthus parvifolius	O	<5%	*Verbena sp.*	O	5%
Trophis scandens	O	<5%	*Physalis peruviana*	U	<5%
Cayratia clematidea	U	<5%			
Solanum opacum	I	<5%			
Alchornea illicifolia	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

Plot 10.1 SW corner photo

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.**	**Abundance**	**% Cover**
Clerodendrum tomentosa	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%
Oplismenis imbecilis	O	<5%	*Solanum pseudocapsicum*	O	<5%
Trophis scandens	O	10%	*Sida rhombifolia*	U	<5%
Eustrephus latifolius	C	<5%			
Aphaneopetalum resinosum	C	15%			
Guoia semiglauca	C	10%			
Pittosporum revolutum	I	<5%			
Notelea venosa	C	20%			
Pandorea pandorana	C	10%			
Alphitonia excelsa	C	10%	Additional Natives		
Pellea 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 subcinireus	U	<5%			
Pittosporum undulatum	C	<5%			
Cryptocarya micronuera	I	<5%			

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

Plot 10.2 NW corner photo

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*

Plot4 NE corner photo

Plot 4 Maintenance Photo

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%
Pittoporum 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		
Pittoporum 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*

Plot 5 NE corner photo

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 2020-2021 Reporting Period

Groundwater Monitoring Results

	MW 1D							
	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Mar-21	Jun-21
pH (pH units)	6.8	7.2	7.1	7	7.3	7.2	7.2	7.2
Conductivity (µS/cm)	1060	1710	1810	1120	1490	1320	1470	1290
TDS (mg/L)	780	1250	1250	700	968	852	1020	877
TSS (mg/L)	NT	24	NT	NT	16	NT	104	98
Temperature (°C)	18.2	22.5	19.4	21.6	22.3	19.4	20	18.4
Alkalinity (mg/L)	NT	237	NT	NT	252	NT	278	256
Sulphate (mg/L)	338	566	596	327	441	318	445	372
Chloride (mg/L)	42	75	63	43	58	50	60	52
Calcium (mg/L)	95	165	166	91	138	106	116	98
Sodium (mg/L)	146	254	245	152	206	198	210	176
Potassium (mg/L)	<1	<1	<1	<1	<1	<1	1	1
Dissolved Arsenic (mg/L)	NT	<0.001	NT	NT	<0.001	NT	<0.001	NT
Dissolved Cadmium (mg/L)	NT	<0.0001	NT	NT	<0.0001	NT	<0.0001	NT
Dissolved Chromium (mg/L)	NT	<0.001	NT	NT	<0.001	NT	<0.001	NT
Dissolved Copper (mg/L)	NT	0.002	NT	NT	0.003	NT	<0.001	0.003
Dissolved Iron (mg/L)	NT	<0.05	NT	NT	<0.05	NT	<0.05	<0.05
Dissolved Lead (mg/L)	NT	<0.001	NT	NT	<0.001	NT	<0.001	NT
Dissolved Mercury (mg/L)	NT	<0.0001	NT	NT	<0.0001	NT	<0.0001	NT
Dissolved Nickel (mg/L)	NT	0.003	NT	NT	0.005	NT	0.005	0.005
Dissolved Zinc (mg/L)	NT	0.025	NT	NT	0.02	NT	0.063	0.026
Ammonia (mg/L)	NT	0.03	NT	NT	0.02	NT	0.05	<0.01
Nitrate (mg/L)	NT	8.53	NT	NT	6.72	NT	5.39	3.99
TKN (mg/L)	NT	1.4	NT	NT	0.9	NT	0.8	1.9
Total Phosphorus (mg/L)	NT	0.15	NT	NT	0.12	NT	0.11	0.39
TOC (mg/L)	NT	4	NT	NT	<1	NT	4	10
Oil & Grease (mg/L)	NT	<5	NT	NT	<5	NT	<5	<5
BOD (mg/L)	NT	6	NT	NT	<2	NT	<2	<2
Depth (mbgl)	23.3	24.2	23.3	22.4	22.21	25.41	22.2	22.64
NT = Not Tested								

	MW 1S							
	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Mar-21	Jun-21
pH (pH units)	Bore inaccessible	6.8	6.8	6.8	6.9	6.6	6.6	7
Conductivity (µS/cm)		1440	1580	994	1210	1190	1000	784
TDS (mg/L)		910	1060	659	763	768	706	543
TSS (mg/L)		33	NT	NT	79	NT	22	41
Temperature (°C)		19.2	19.3	21.6	21.1	19.9	19.6	18.5
Alkalinity (mg/L)		226	NT	NT	221	NT	144	105
Sulphate (mg/L)		298	309	296	319	265	308	243
Chloride (mg/L)		199	232	51	79	72	44	30
Calcium (mg/L)		102	114	50	75	68	43	30
Sodium (mg/L)		147	135	121	129	149	132	104
Potassium (mg/L)		3	2	3	2	3	3	4
Dissolved Arsenic (mg/L)		NT	NT	NT	<0.001	NT	NT	NT
Dissolved Cadmium (mg/L)		NT	NT	NT	<0.0001	NT	NT	NT
Dissolved Chromium (mg/L)		NT	NT	NT	<0.001	NT	NT	NT
Dissolved Copper (mg/L)		0.018	NT	NT	0.022	NT	0.03	0.01
Dissolved Iron (mg/L)		0.07	NT	NT	<0.05	NT	<0.05	<0.05
Dissolved Lead (mg/L)		NT	NT	NT	<0.001	NT	NT	NT
Dissolved Mercury (mg/L)		NT	NT	NT	<0.0001	NT	NT	NT
Dissolved Nickel (mg/L)		<0.001	NT	NT	0.002	NT	0.002	<0.001
Dissolved Zinc (mg/L)		0.052	NT	NT	0.032	NT	0.061	0.064
Ammonia (mg/L)		0.06	NT	NT	<0.01	NT	0.02	<0.01
Nitrate (mg/L)		1.49	NT	NT	0.65	NT	0.35	1.84
TKN (mg/L)		1.5	NT	NT	2.8	NT	0.7	1.2
Total Phosphorus (mg/L)		0.15	NT	NT	0.89	NT	0.05	0.12
TOC (mg/L)		18	NT	NT	9	NT	10	20
Oil & Grease (mg/L)		<5	NT	NT	<5	NT	<5	<5
BOD (mg/L)		2	NT	NT	<2	NT	<2	<2
Depth (mbgl)		6.6	6.56	5.23	6.01	5.25	4.48	4.01
NT = Not Tested								

	MW 2D							
	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Mar-21	Jun-21
pH (pH units)	7.3	7.3	7.3	7.4	7.4	7.3	7.3	7.5
Conductivity (µS/cm)	1710	1730	1650	1760	1830	1640	1770	1800
TDS (mg/L)	1200	1130	1170	1100	1110	1110	1090	1090
TSS (mg/L)	NT	16	NT	NT	22	NT	30	15
Temperature (°C)	17.4	21.8	18.7	20.8	23.5	18.7	18.6	18.7
Alkalinity (mg/L)	NT	326	NT	NT	357	NT	336	326
Sulphate (mg/L)	234	248	258	246	253	179	229	239
Chloride (mg/L)	301	319	290	305	277	307	299	275
Calcium (mg/L)	113	119	124	112	120	122	112	113
Sodium (mg/L)	198	201	186	187	186	208	189	192
Potassium (mg/L)	1	1	2	2	2	2	2	2
Dissolved Arsenic (mg/L)	NT	NT	NT	NT	NT	NT	NT	0.002
Dissolved Cadmium (mg/L)	NT	NT	NT	NT	NT	NT	NT	<0.0001
Dissolved Chromium (mg/L)	NT	NT	NT	NT	NT	NT	NT	<0.001
Dissolved Copper (mg/L)	NT	0.005	NT	NT	<0.001	NT	<0.001	<0.001
Dissolved Iron (mg/L)	NT	<0.05	NT	NT	0.26	NT	<0.05	<0.05
Dissolved Lead (mg/L)	NT	NT	NT	NT	NT	NT	NT	<0.001
Dissolved Mercury (mg/L)	NT	NT	NT	NT	NT	NT	NT	<0.0001
Dissolved Nickel (mg/L)	NT	<0.001	NT	NT	0.003	NT	0.007	0.003
Dissolved Zinc (mg/L)	NT	0.029	NT	NT	0.016	NT	0.05	0.049
Ammonia (mg/L)	NT	<0.01	NT	NT	0.85	NT	0.79	0.2
Nitrate (mg/L)	NT	0.22	NT	NT	<0.01	NT	0.04	0.14
TKN (mg/L)	NT	0.4	NT	NT	0.9	NT	0.9	0.5
Total Phosphorus (mg/L)	NT	0.04	NT	NT	0.06	NT	0.09	0.09
TOC (mg/L)	NT	<1	NT	NT	<1	NT	2	15
Oil & Grease (mg/L)	NT	<5	NT	NT	<5	NT	<5	<5
BOD (mg/L)	NT	2	NT	NT	<2	NT	5	<2
Depth (mbgl)	15.7	11.6	13.4	12.4	12.81	11.99	12.2	10.83
NT = Not Tested								

	MW 2S							
	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Mar-21	Jun-21
pH (pH units)	6.6	7	6.9	6.8	7	6.9	6.9	7
Conductivity (µS/cm)	925	1250	1200	1160	1320	1250	1230	1040
TDS (mg/L)	678	874	874	810	906	886	788	716
TSS (mg/L)	NT	45	NT	NT	78	NT	<5	80
Temperature (°C)	18.1	22.6	18.7	21.1	23.4	19	18.4	18.1
Alkalinity (mg/L)	NT	296	NT	NT	380	NT	326	230
Sulphate (mg/L)	302	328	318	309	304	240	260	250
Chloride (mg/L)	45	64	55	56	62	71	57	52
Calcium (mg/L)	46	87	93	74	93	103	83	61
Sodium (mg/L)	126	145	136	132	137	160	133	116
Potassium (mg/L)	<1	<1	<1	<1	<1	<1	<1	1
Dissolved Arsenic (mg/L)	NT	NT	NT	NT	<0.001	NT	NT	NT
Dissolved Cadmium (mg/L)	NT	NT	NT	NT	<0.0001	NT	NT	NT
Dissolved Chromium (mg/L)	NT	NT	NT	NT	<0.001	NT	NT	NT
Dissolved Copper (mg/L)	NT	0.003	NT	NT	0.003	NT	0.003	0.008
Dissolved Iron (mg/L)	NT	<0.05	NT	NT	<0.05	NT	<0.05	<0.05
Dissolved Lead (mg/L)	NT	NT	NT	NT	<0.001	NT	NT	NT
Dissolved Mercury (mg/L)	NT	NT	NT	NT	<0.0001	NT	NT	NT
Dissolved Nickel (mg/L)	NT	<0.001	NT	NT	0.003	NT	<0.001	<0.001
Dissolved Zinc (mg/L)	NT	0.032	NT	NT	0.019	NT	0.036	0.057
Ammonia (mg/L)	NT	0.01	NT	NT	<0.01	NT	<0.01	<0.01
Nitrate (mg/L)	NT	2.3	NT	NT	1.81	NT	1.39	1.39
TKN (mg/L)	NT	0.6	NT	NT	1.7	NT	0.3	0.5
Total Phosphorus (mg/L)	NT	0.07	NT	NT	0.64	NT	0.07	0.11
TOC (mg/L)	NT	1	NT	NT	<1	NT	<1	14
Oil & Grease (mg/L)	NT	<5	NT	NT	<5	NT	<5	<5
BOD (mg/L)	NT	<2	NT	NT	<2	NT	<2	<2
Depth (mbgl)	10.6	9.1	10.6	9.9	10.49	10.19	10.3	9.55
NT = Not Tested								

Watercourse Quality Monitoring Results

	Watercourse 1					Watercourse 2				
	Sep-20	Oct-20	Dec-20	Mar-21	Jun-21	Sep-20	Oct-20	Dec-20	Mar-21	Jun-21
EC (µS/cm)	494	265	1020	1130	920	dry	dry	dry	dry	1250
pH (pH units)	6.3	6.9	7.2	7.1	7.4	dry	dry	dry	dry	7.6
Temperature (°C)	18.9	20.1	21.7	19.2	14.9	dry	dry	dry	dry	16.5
Turbidity (NTU)	39.7	49.8	16.2	11.9	2	dry	dry	dry	dry	12.3
Oil and Grease (mg/L)	<5	<5	<5	<5	<5	dry	dry	dry	dry	<5
TSS (mg/L)	54	9	45	43	17	dry	dry	dry	dry	53
TDS (mg/L)	372	279	676	621	592	dry	dry	dry	dry	877
Sodium (mg/L)	75	41	122	142	107	dry	dry	dry	dry	126
Potassium (mg/L)	2	2	2	2	2	dry	dry	dry	dry	3
Calcium (mg/L)	20	9	54	68	54	dry	dry	dry	dry	88
Sulphate (mg/L)	30	34	263	310	247	dry	dry	dry	dry	415
Chloride (mg/L)	117	48	49	45	31	dry	dry	dry	dry	35
Alkalinity (mg/L)	107	44	222	249	198	dry	dry	dry	dry	179
Dissolved Copper (mg/L)	0.008	0.058	0.002	0.001	0.004	dry	dry	dry	dry	0.002
Dissolved Iron (mg/L)	0.29	0.38	0.32	0.37	0.05	dry	dry	dry	dry	<0.05
Dissolved Arsenic (mg/L)	NT	NT	<0.001	<0.001	NT	NT	NT	NT	NT	NT
Dissolved Cadmium (mg/L)	NT	NT	<0.0001	<0.0001	NT	NT	NT	NT	NT	NT
Dissolved Chromium (mg/L)	NT	NT	<0.001	0.001	NT	NT	NT	NT	NT	NT
Dissolved Lead (mg/L)	NT	NT	<0.001	<0.001	NT	NT	NT	NT	NT	NT
Dissolved Mercury (mg/L)	NT	NT	<0.0001	<0.0001	NT	NT	NT	NT	NT	NT
Dissolved Nickel (mg/L)	NT	NT	<0.001	<0.001	NT	NT	NT	NT	NT	NT
Dissolved Zinc (mg/L)	NT	NT	0.056	0.056	NT	NT	NT	NT	NT	NT
NT = Not Tested										

Watercourse Flow Monitoring Results

	Flow (L/sec)	
Month	**WC1**	**WC2**
Jul-20	0.024	71
Aug-20	no flow	185
Sep-20	dry	dry
Oct-20	0.034	dry
Nov-20	dry	dry
Dec-20	dry	dry
Jan-21	dry	dry
Feb-21	dry	dry
Mar-21	dry	20
Apr-21	no flow	no flow
May-21	no flow	65
Jun-21	no flow	15

Stream West of Quarry Manager's Office

Date	pH (pH units)	Oil and Grease (mg/L)	TSS (mg/L)
03/07/2020	7.9	<5	11
12/08/2020	8.1	<5	25
04/09/2020	8.1	<5	11
06/10/2020	8.1	<5	38
13/11/2020	8.4	<5	61
04/12/2020	8.4	<5	59
05/01/2021	7.8	<5	43
04/02/2021	8.3	<5	13
03/03/2021	8.1	<5	32
01/04/2021	8.1	<5	20
04/05/2021	8.1	<5	27
04/06/2021	8.1	<5	36

Sewage Treatment Plan Effluent Monitoring

Date	Oil and Grease (mg/L)	TSS (mg/L)	BOD_5 (mg/L)
22/09/2020	<5	32	16
15/12/2020	<5	16	15
29/03/2021	<5	<5	<2
28/06/2021	<5	13	3

Quarry Extension Discharge Monitoring

Date	pH (pH units)	Turbidity (NTU)
16/07/2020	7.3	15.8
27/07/2020	8.21	20
28/07/2020	8.1	22.1
29/07/2020	8.2	19.6
30/07/2020	8.1	19.6
31/07/2020	8.2	19.4
03/08/2020	8.1	19.2
04/08/2020	8.3	19.3
05/08/2020	7.9	18.6
06/08/2020	8.1	18.9
07/08/2020	8.3	19.2
08/08/2020	8	24.3
09/08/2020	8.1	28.2
10/08/2020	8.2	66.5
11/08/2020	8.2	28.9
12/08/2020	8.1	23.4
13/08/2020	8.1	21.5
14/08/2020	7.9	19.6
03/11/2020	7.4	15.9
04/11/2020	7.9	9
06/11/2020	7.8	11
07/01/2021	8.2	9.4
19/03/2021	7.25	16.4
22/03/2021	7.7	28.1
23/03/2021	7	23.2
24/03/2021	8	26.2
25/03/2021	7.6	21.6
26/03/2021	7.2	20.4
05/05/2021	7.1	17.6
06/05/2021	7.3	19
07/05/2021	7.9	26.3
10/05/2021	7	23.6
11/05/2021	7.1	24.7

Deposited Dust Monitoring

All in g/m^2/mth	APD1		APD2		APD3		APD4	
Month	Ash	TIS	Ash	TIS	Ash	TIS	Ash	TIS
Jul-20	6.3	7.0	1.0	1.1	0.2	0.2	3.4	4.6
Aug-20	6.7	8.3	*	*	0.8	1.0	2.3	4.1
Sep-20	5.8	7.3	0.5	0.5	0.3	0.3	1.1	1.6
Oct-20	8.4	9.6	1.9	4.0	1.5	2.7	1.9	2.9
Nov-20	12.5	12.5	*	*	1.2	1.5	1.6	7.7
Dec-20	5.6	6.7	3.2	7.6	0.9	1.4	0.6	1.0
Jan-21	3.4	4.3	1.3	1.8	0.6	0.9	0.5	0.6
Feb-21	1.2	1.5	1.6	1.9	0.6	1.0	0.7	1.0
Mar-21	7.5	8.8	1.1	1.5	1.5	3.0	1.1	1.4
Apr-21	15.1	17.5	1.7	2.2	0.7	1.3	1.4	1.6
May-21	3.6	4.4	0.6	0.7	0.2	0.4	0.4	0.5
Jun-21	23.5	26.2	*	*	1.0	1.5	1.6	2.2

* 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)
01/07/2020	16.5	05/10/2020	27.0	03/01/2021	6.0	03/04/2021	7.2
07/07/2020	7.5	11/10/2020	11.6	09/01/2021	4.0	09/04/2021	#
13/07/2020	*	17/10/2020	25.6	15/01/2021	21.2	15/04/2021	39.4
19/07/2020	*	23/10/2020	16.2	21/01/2021	22.5	21/04/2021	9.5
25/07/2020	11.9	29/10/2020	3.0	27/01/2021	5.3	27/04/2021	29.2
31/07/2020	11.8	04/11/2020	27.1	02/02/2021	7.6	03/05/2021	30.5
06/08/2020	8.2	10/11/2020	21.8	08/02/2021	10.0	09/05/2021	14.6
12/08/2020	21.2	16/11/2020	90.4	14/02/2021	8.5	15/05/2021	25.3
18/08/2020	12.4	22/11/2020	27.0	20/02/2021	7.9	21/05/2021	7.0
24/08/2020	15.7	28/11/2020	51.3	26/02/2021	13.8	27/05/2021	12.8
30/08/2020	28.1	04/12/2020	17.9	04/03/2021	21.7	02/06/2021	18.9
05/09/2020	10.3	10/12/2020	32.0	10/03/2021	9.6	08/06/2021	18.6
11/09/2020	11.5	16/12/2020	7.9	16/03/2021	10.1	14/06/2021	1.0
17/09/2020	26.8	22/12/2020	7.8	22/03/2021	10.8	20/06/2021	0.8
23/09/2020	62.0	28/12/2020	16.9	28/03/2021	8.1	26/06/2021	9.8
29/09/2020	25.1	* Property power outage - monitor did not record;# Unit malfunction - monitor did not record					

Annexure F

Annual Noise Survey – August 2020

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